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THE TELEGRAPHIC JOURNAL AND
Electrical Review.
VOL. XII.—No. 285.

THE TELEPHONE.

WE are apparently on the eve of great activity in the development of telephonic matters, a considerable stir in this direction having taken place within the last three weeks. Why London, with its four million or so of inhabitants, should be worse off as regards telephonic communication than many a town in America whose population might be multiplied by fifty or even more, to compare with the figures given for our metropolis, is a subject we need not discuss at length. The heavy prices charged for renting instruments, the not too reliable service of communication, and the monopoly hitherto held by the only company actually at work, have not been conducive to the extension of the telephone in England.

Referring for a moment to a subject which, commercially speaking, sprang into existence about the same time as the telephone, viz., the electric light, we think it will be generally admitted that, as far as actual needs are concerned, business men can dispense with the latter. Without for a moment losing sight of the favourable opinion we have always held as to the value of electric lighting prospects, which we firmly believe will soon become even brighter than before, it cannot be denied that in many cases where the light has been tried it has, after ample experiment and time for observation, been discarded. With the telephone the case would be entirely different. It is difficult to imagine a man with extensive business operations and connections giving up the use of the telephone after having experienced for ever so short a time the advantages it brings to him. In fact the telephone will shortly be an absolute necessity for every business house and for many private individuals.

Hitherto we have not been able to obtain this necessity of the future on sufficiently favourable terms, hence the limited telephonic communication in our great city. Two companies, the London and Globe, and the Long-Distance Telephone, respectively, are now endeavouring to place themselves in a position to supply to some extent that which we have up to the present been denied. The former company made its appearance last year under circumstances well known to our readers, and after various vicissitudes the company seems now about entering upon its work, and on favourable conditions to the public. It would be premature to say much of the Long-Distance Telephone Company at present, and therefore we can only await the result of its lawsuit with the United Telephone Company. Whatever opinions may be held in regard to the continued action of this latter company whenever an attempt is made to bring forward either a new or improved form of apparatus, it would at least be deserving of sympathy in one particular instance, were it not that in all probability the treatment complained of has been induced directly by its own treatment of its adversaries. The directors notify that its wires of communication in several parts of London have been maliciously injured and tied up in groups, thus placing various subscribers in communication with each other. The effect of this has been in some cases an intermittent ringing of bells, and in others the placing of the groups of wires so treated to earth, thereby stopping all communication, and making it appear that inattention on the part of the Exchange switch rooms was the cause. The private wires of subscribers have also in like manner been interfered with. We need not attempt to divine the parties responsible for such conduct, but it appears to us that it is un-English like to say the least, and not at all calculated to win the support of the public, but rather to increase that already accorded to the unfortunate and, perhaps, primarily faulty company, whose wires have been thus tampered with. Such paltry meanness as this cannot be too strongly condemned, and we should be glad to hear that the offenders have been detected and brought to justice.

With respect to long-distance telephoning we are not surprised to find that our remarks on this subject are fully borne out by a communication received by the United Telephone Company from the general manager of the American Bell Company. This communication runs as follows, and relates to the long-distance tests recently made in America, and commented upon in the ELECTRICAL REVIEW :—"The tests in question were simply made to bring into notice the Postal Telegraph Company and their wires. All forms of telephones were used, and each patentee was allowed to make a trial. None of the tests were eminently satisfactory, owing to the earth currents. Still, conversation did at times take place over the wire. The most satisfactory tests undoubtedly resulted from the use of a double Edison transmitter, with an ordinary Bell receiver. It has, however, in our opinion demonstrated one thing, that is, that it is not impracticable to talk long distances, provided wire of sufficiently low resistance is used." It will be seen from this, that with any of the instruments at present used, partial conversation at times could be carried on over a distance of 1,000 miles, but this was due to the conductor solely, as we have already pointed out.

It must not be forgotten that the comparative resistances of both the conductor and the insulators require to be taken into consideration. If we imagine a line with practically no resistance as far as the conductor is concerned, then even if insulation resistance were excessively low, nearly the same current strength would arrive at the distant end as left the transmitting station. On the other hand, with a conductor of very high resistance and an insulation also comparatively high, the reverse would take place, that is, nearly all the current would be lost before arriving at the distant station.

As we know the new wire between New York and Chicago has a very low conductor resistance, we cannot look upon the tests over that line as anything extraordinary, indeed we should be much better satisfied with successful tests over an English line, say, from London to Manchester.

Vagaries of the Telegraph.—"Your ships in two off Holyhead," was the telegram delivered the other day to a Glasgow shipowner. After the lapse of half an hour, the horror of the tidings was somewhat mitigated by a message from the Post Office to the effect that the word "two" was wrongly spelled and should read "tow"!!!

PROFESSIONAL MEN.

(A COMMUNICATION.)

AMONG the subjects which from time to time thrust themselves upon our attention by the force of passing circumstances, and tacitly demand consideration, may be mentioned that of the claims of persons who follow certain pursuits to occupy the status of "professional men," and of their particular callings to be elevated to the dignity of "professions." Originally, as is well known, the term "profession" was restricted to the three vocations of law, medicine and divinity, but at the present day engineering, sculpture, painting, and many other callings are included among the list of professions, and their number is constantly increasing with the advance of refinement and civilisation. It is, perhaps, not easy to find any definition of what constitutes a professional man which will meet every case; at first sight it might seem that it is sufficient to draw the line between mental and manual labour, and to place the former under the head of "professional" and the latter outside of the pale of a profession, but on reflection it will be evident that a good deal of the work of professional men is manual, and that artisans have to employ their brains in the discharge of their regular every-day duties. There is no doubt, however, that the term "profession" does imply the especial exercise of the *mental* faculties, and that it is only applicable to those callings in the pursuit of which genius is necessary; but, after all, there is no rigid line of separation between vocations which are professional and those which are non-professional; it is very much a question of degree, still where verbal definition fails intuitive perception is frequently a very safe guide in determining whether any particular calling is or is not entitled to the designation of professional.

There is, however, one feature which especially marks or should mark a professional man, and distinguish him from persons who follow occupations non-professional, and that is that the work executed in his name bears the impress of his own professional skill and genius. A purveyor, say, for example, a wholesale tallow-chandler or grocer, finds capital with which to carry on his business, and exercises a certain amount of supervision over it, but he rarely handles the commodities in which he deals. On the other hand, in the products of the professional man, properly so-called, his own individuality is visibly impressed; he is not a mere capitalist or administrator employing others to labour and himself receiving the profit and credit of its results, but his works are conceived by his own mind and executed by his own hands.

Tried by this test, however, it is to be feared that many persons who lay claim to the dignity of "professional" fall very short of making good their title to this distinction. Take engineers in extensive practice, how many of their schemes are the product of their own brains? In most cases the whole credit of them is due to assistants, even their professional opinions being really the opinions of the latter. In a patent action tried some time since in which an engineer of standing figured as one of the witnesses, this gentleman betrayed the utmost ignorance of the contents of his own patents, and gave others the impression, possibly ill founded, that he had had but a very small hand in the development of their subject matter. Again, if we turn to the legal profession, how large a portion of the skilled labour in a solicitor's office is performed by subordinates; in fact, in some cases the clerk has charge of a case and conducts it into court without any supervision, and yet all is done in the name of his employer, who derives his reputation from it. And even barristers—Queen's counsel—in large practice have, it is said, a good deal of help of the same kind. We have heard talk of "ghosts" which visit sculptor's studios and invest their work with artistic merit, but it is currently reported that barristers have their "devils" who perform for them the like good offices. And let us add that patent agents too have their "devils." The writer of these lines has been behind the scenes and witnessed the shifts and subterfuges resorted to to make the public believe that the responsible work is executed by the principal. Every man, however, possessed of a spark of right feeling must instinctively shrink from connivance at such practices.

This is a rankling sore in professional life, which, it is to be feared, extends its ramifications through almost all professions, and affects either directly or indirectly nearly every class and condition of society. A man who is so destitute of genius that if he had to earn his bread by the sweat of his own brain he would fall far below mediocrity may yet, by the possession of a certain amount of capital and influence, command the service of skilled assistants, who, from circumstances beyond their control, are obliged to sell their brains for a scanty pittance, and he may thus succeed in building up for himself a reputation on the product of their ingenuity, and in attaining to a position of wealth and affluence. This is one of "the things done under the sun," akin to those the wise man speaks of, and is a "great evil." One man sows and another reaps the fruit of his labours. Verily, these things should not so be.

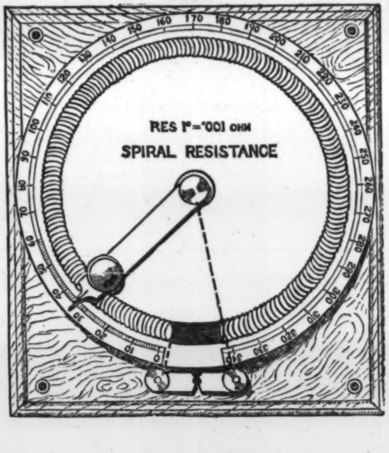
ON A NEW FORM OF RESISTANCE WITH SPIRAL COILS OF WIRE.

By HENRY F. JOEL, C.E.

IN most of the installations of the electric light an adjustable resistance is as much a necessity as a current measurer, switch, or such apparatus; but these several instruments help to make the electric light plant expensive. It has been the object of the writer to make a complete set of such necessary apparatus in the most simple, reliable, and economical manner, and the resistance now described forms part of such a set of apparatus.

A spiral of German silver, iron, or platinum wire is bent round a central block of wood or is otherwise fixed in position; in the centre of the spiral there is pivoted a metal contact arm, which presses on its outer end directly upon the top surfaces of the spirals; the pivot end of the contact arm is connected to one terminal, and one end of the spiral is connected to the other terminal, the other end of spiral being insulated. It is obvious that, as the contact arm is moved round, more or less of the wire spiral resistance is inserted in the circuit.

FIG. I.



This form of resistance possesses some important practical advantages, the spring of the coils of wire enables a good contact to be made without much friction, whilst the resistance can be adjusted to almost any degree of nicety, and at the same time the apparatus is simple and inexpensive.

In fig. 1, a complete spiral resistance, the contact arm is provided with a knob for convenience of moving, and a divided scale indicates the resistance to be introduced; a supplementary short circuit plug is shown; this is at times very useful.

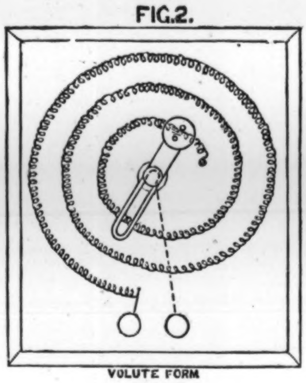
Fig. 2 shows the wire coiled in the form of a volute spiral. In this form the contact arm has two pins fitted with rollers projecting downwards on each side of the wire coils, and the other end of the arm is slotted; when the contact arm is moved the pins act as guides, whilst the slotted end enables the contact arm to follow the convolutions of the spiral; this form of resistance gives a greater range than the circular form of fig. 1.

Fig. 3 shows a detail of the contact arm and spiral.

Fig. 4 shows an application of the spiral resistance to regulate the discharge of a number of accumulators, or any other electric generator, such as a dynamo-machine, and this arrangement also answers for keeping the resistance of a circuit constant should any of the lamps be turned out.

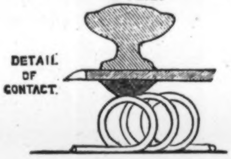
In this application the accumulators are shown at the top, connected on the one side to some electric lamps in multiple arc, and on the other to a solenoid coil. The spiral resistance is introduced between the two, a core is free to move in the solenoid, and when no current is passing is pulled over by a spring attached to one end; on the other end of the core a rack is fixed which gears into a pinion; on the same axis as the pinion a ratchet-wheel is pivoted, and this wheel by means of a spring pawl is connected to the contact arm. When the contact arm is moved the resistance is decreased or increased; with the ratchet-wheel and pawl it decreases the resistance only, but without the ratchet-wheel and pawl it acts both ways.

FIG.2.



VOLUTE FORM

FIG.3.



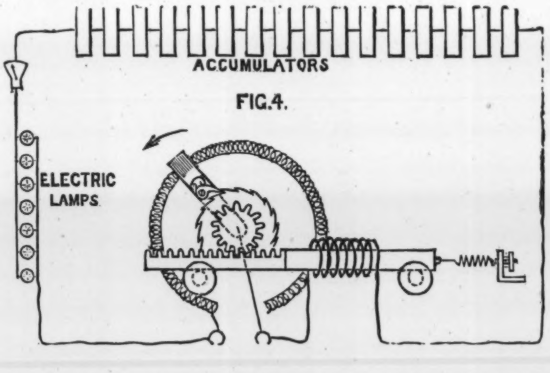


FIG.4.

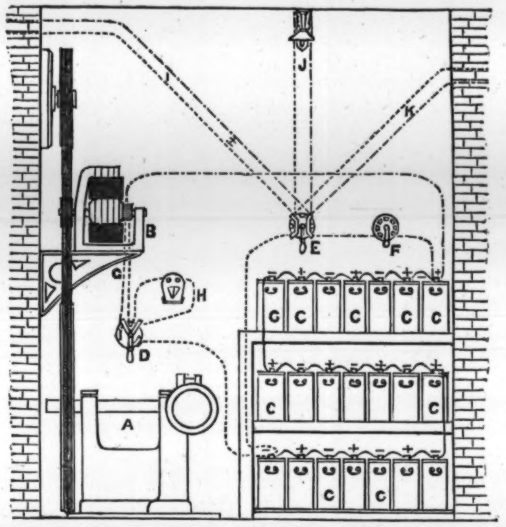
When the current passes through the solenoid the attraction of the core overcomes the spring, and the rack moves forward; should the current decrease in strength, the spring pulls the core back, and this moves the contact arm in the direction of the arrow, and thus decreases the resistance; the current is then again restored to the required strength, and the rack pulled back ready for further action.

This application of resistance coils in a spiral form should be of considerable service in many instances, and will help to surmount one of the difficulties in the way of the successful application of electric lighting, viz., keeping the circuit at a constant resistance.

ELECTRIC LIGHT INSTALLATIONS FOR OFFICES, &c.

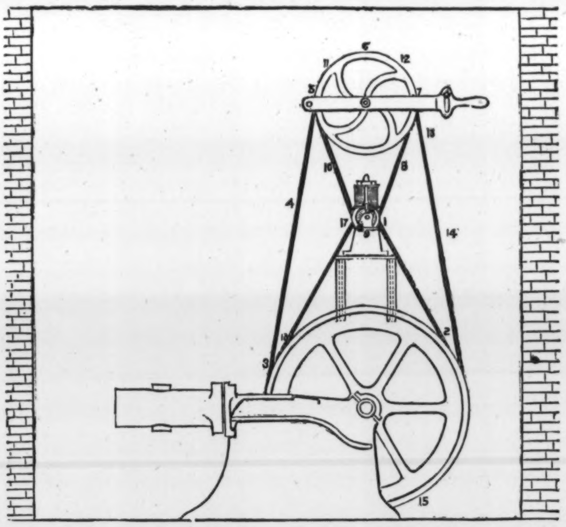
At the offices of The Electrical Power Storage Company, Limited, 30 Swan incandescence lamps illuminate the whole suite of rooms pleasantly and thoroughly. All the lamps are suspended by tastefully-executed electroliers and wall-brackets, made by Messrs. Benjamin Verity & Sons, of Stanhope Street, Euston Road.

None of the wires are visible. Plug switches are provided for each room, and these, as well as all the circuit fittings and the gearing were made at the works of the company.



The engine-room in the basement of the Great Winchester Street Buildings measures only 13 feet long, 6 feet wide and 8 feet high, and therein stand the prime mover, the dynamo, the accumulator and necessary accessories, leaving ample room to walk round and examine everything easily.

The motive power is a one H. P. Otto gas-engine, running at 180 revolutions per minute; this drives a Siemens' S D_5 dynamo at 1,600 revolutions, by which a series of 23 one H. P. accumulators are charged. The charging is done during the day for a few hours, according to the demand, and little attention is required for the mechanism, as the office messenger starts the engine and oils the bearings, examines the deflections on the ammeter, and returns to his ordinary duties. When he considers that the current has been flowing a sufficient length of time, he once more enters the engine-room and stops the whole apparatus, which is always ready for immediate use. Every kind of noise and vibration had to be carefully avoided, and in order to com-



ply with these conditions, the engine, dynamo, and brackets carrying moving parts, their bases, joining the wall and floor, were provided with felt and india-rubber packing.

The one H. P. Faure-Sellon-Volckmar accumulators occupy each an area of half a square foot, and they stand 12 inches high ; these cells, when fully charged, can supply the whole of the lamps for nine hours and still leave the economical residual charge in the boxes, the engine being at rest all the time ; in many cases it is found convenient to run the dynamo at the same time whilst the lights are fed by accumulators, and this method increases the period of lighting in exact proportion to the extra current from the dynamo.

One of the interesting features of this installation is probably in the gearing which transmits the power from the engine shaft to the dynamo spindle. This method of driving was devised by M. Raffard, of Paris, and it has been applied by the Electrical Power Storage Company in several installations where moderate power is used ; it works very well indeed, and without the trouble often experienced in small strap and pulley transmissions.

The accompanying drawings will sufficiently explain the details of this gear. The fly-wheel of the gas-engine has two V grooves cut in its rim, and in these grooves runs a cat-gut band $\frac{5}{16}$ inch in diameter. The loose guide pulley and the pulley on the dynamo spindle are each provided with two corresponding V grooves. The numbers against the band show the mode of placing it on the three rotating parts ; the pin of the guide-pulley is supported by a stretching lever, which permits of adjustment when the cat-gut becomes elongated through wear. Nearly the whole of the circumference of the dynamo pulley is taken up by the band, giving it a good grip and preventing slip, which is of the utmost importance considering that this pulley is only $5\frac{3}{8}$ inches in diameter. There is a perfect equilibrium in the tension of the bands, and consequently the friction on the dynamo bearings is practically *nil*, the armature of the machine maintains its central position and the wear is necessarily avoided. The whole pressure is taken up by the bearing and pin of the guide pulley, which runs at a very much slower speed than the armature, requiring, therefore, less lubrication, and the friction of the entire apparatus is considerably less than of any other mechanism at present known to transmit power at a high speed. This installation has been in successful operation since August, 1882.

In the drawings, A is the motor, B the dynamo, C Faure-Sellon-Volckmar accumulators, D switch, E current reverser, F resistance coils, G shunt wire, H ammeter, I lamp circuit, J ditto, K ditto. The positive wires are shown thus, —— - —— - —— - ; and the negative, - - - - - - -.

Telephones in France.—The French Administration of Posts and Telegraphs, says the *Journal Télégraphique de Berne*, has just opened in some towns, particularly in Rheims, Roubaix, and Tourcoing, systems of telephonic communication, which offer greater advantages than systems of private telephone companies. For example, telephonic communication is not limited to the precincts of the town itself, but may be extended to the houses in the suburbs. Besides the usual system of communication between the subscribers, the new service places at the disposal of the public telephone calls, put up in the post and telegraph offices, in the railway stations, and in certain buildings belonging to the state or to the towns. The charge is 25 centimes for every five minutes, and any person can thus place himself in direct communication either with the subscribers or with the different localities, if he is provided with these call boxes. The subscribers, on their part, may use their telephones to receive or forward messages, without any extra charge, the telephonic transmission being considered the equivalent, either of the transaction of handing in the message at the counter, or of the delivery at the address by the messengers. This service, which will shortly be extended to Nice, St. Etienne, St. Quentin, Montpellier, &c., is organised, by way of experiment, to enable the Telegraph Administration to estimate to what extent they ought to make it general, and apply it especially to Paris and other large towns in which telephonic communication is at present in the hands of the Société Générale des Téléphones, but from whom the Government has reserved to itself the right of buying back the concessions.

ELECTRIC LIGHTING OF NOTTINGHAM.

Specifications and Tenders Furnished by the Telegraph Construction and Maintenance Company (Limited) to the Corporation of Nottingham.

Specification and Tender No. I.—60,000 Lamps.

General Nature of the Installation.

The installation to consist of the necessary mains, machinery, reserve machinery and buildings, as specified below, for the continuous supply of a current of electricity to all the houses, warehouses, shops, factories, street lamps, &c., in the district marked on the map, sufficient for the maintenance of 60,000 (sixty thousand) Swan lamps of 20 candle-power [*] each during 16 hours out of the 24, and of one-third of that number during the remaining 8 hours.

Electromotive Force.

The current to be supplied at an E. M. F. of not more than 70 volts, and so that the Swan lamps can all be arranged "in quantity."

The Dynamos.

Five Gordon dynamos to be provided, four to work, one spare, each being capable of continuously maintaining 15,000 Swan lamps of 20 candle-power each for 16 hours out of the 24, when running at a speed not exceeding 150 revolutions per minute.[†]

The magnets to revolve, and the current to be taken off directly from the fixed armature coils without rubbing contacts.

The dynamos to be connected direct to the engines without belts.[‡]

The Exciters.

Six sets of direct current machines to be provided to excite the magnets of the large dynamos, one set to be used for each dynamo and one to be in reserve, so that it can be instantly connected to any one of the dynamos in case of its own exciter getting out of order.

The Engines (for the Large Dynamos).

Each dynamo will require when working all its lamps about 1,530 I. H. P.

Two engines to be provided for each dynamo, to be coupled one to each end of the shaft. Each engine to be capable of developing 850 I. H. P. Thus ten engines in all are to be provided for driving the large dynamos. The engines to be compound, condensing, tandem, of the vertical inverted cylinder type. They are each to have one high pressure cylinder on the top of one low pressure cylinder, one piston rod carrying both pistons. They are specially designed for electric light work, with extra large crank shafts and bearing surfaces, and special methods for lubricating all parts without stopping. They are to be fitted with the best governors that can be obtained, and are to be in all respects capable of running at 150 revolutions per minute for 16 consecutive hours in each day without ever stopping. They are to work at a pressure of 100 lbs. per square inch.[§]

The Small Engines (for the Exciters).

Six small engines to be provided for driving the exciters, each to indicate up to 60 H. P.[‖]

These engines to be also compound, but will not have separate condensers ; they are to be connected to the condensers of the larger engine.[¶]

Boilers.

Thirty-eight flue-boilers, fitted with Galloway tubes, to be provided, capable each of developing about 220 I. H. P., so that thirty of them may be at work and eight idle. Patent automatic steam-stoking apparatus to be provided, as also all the usual gauges, &c.

Steam Pipes and Connections.

All necessary steam-pipes and connections to be provided.

Provision to be made for shutting off any boiler or any engine as required, and for removing any pipe without stopping the supply of electricity.

The Engine-house, Boiler-house, Coal Store, and Chimney.[**]

Adjoining the boiler-house is to be a store for 1,000 tons of coal (about three weeks' winter supply). The floor of the store is to be above the level of the boilers, so that the coal, after being placed in it will not have to be lifted again. A 4-ton power-hoist and raised tramway is to be provided for filling the store. Arrangements are to be made so that the coal is discharged from the store into trucks running on tramways above the level of the boilers and discharging into the hoppers of the mechanical stokers. Another tramway, on a lower level, is to be provided for the removal of the ashes, and is to carry them to the bottom of the hoist above mentioned, which will lift them to a convenient height for discharging into waggons.

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[*] Mr. Swan is now making lamps of 40 and 100 candle-power (for street lighting, &c.) which can be used with the 20 candle-power lamps. They take the current of two and five 20 candle lamps respectively.

[†] It will be seen that this allows ample provision for maintaining 60,000 lamps all night, and a smaller number in the day ; the supply being continuous.

[‡] These dynamos are excessively strong, the revolving parts being built up of wrought iron plate. The total weight of each dynamo is about 45 tons.

[§] These engines are extremely economical of coal and are practically silent.

[‖] The use of separate engines for the exciters enables the current to be regulated by varying the speed of the small engines, and without the waste which would be involved if the regulation were done by the introduction of resistance.

[¶] Thus, when all the 60,000 lamps are at work four dynamos and four exciters will be in use, requiring in all 6,360 I. H. P.

[**] The Telegraph Construction and Maintenance Company would prefer to do the whole of this work, and not to have it done by the Corporation, as at first proposed. It is included in the price given below.

In the engine-house is to be a gallery containing the regulating rooms.

The design for the exterior of the building to be subject to the approval of the corporation.

The Corporation to provide the site, and to bring to it a suitable water supply and to provide for the removal of the waste water.

The Traveller.

A 20-ton power-traveller to be supplied and fixed in the engine-room, so that it can lift any portion of the engines or dynamos that may at any time require lifting.

Regulating Apparatus and other Fittings.

The following fittings and regulating apparatus to be furnished :—

Eight photometers, 6 ammeters, 10 volt-meters, 8 registering volt-meters, 5 strophometers, 5 steam-gauges, switches and slow motion levers to exciting engines.*

Suitable plug boards for varying connections of dynamos and removing defective coils.

All suitable apparatus for rapidly substituting one large dynamo for another in a circuit, and for substituting one exciter for another.

Foundations and Fixing.

All necessary foundations to be built, and all the boilers, machinery, &c., to be properly fixed.

The Mains.

The mains to consist of copper rods of not less than 96 per cent. conductivity, efficiently insulated and inclosed in iron tubes, separate tubes being provided for the line wire and for the return.

The section of the copper is to be such that when any portion is carrying the full current for the number of 20 candle Swan lamps that it is specified to carry, such current shall not exceed 1,750 ampères per square inch section of copper.

All necessary junction and testing boxes to be provided.

Laying the Mains.

The mains to be laid underground. Each machine has two circuits, so the four working machines supply eight circuits in all.

There are four sets of lines radiating from the engine house; each line represents two circuits (or four conductors).

The two circuits shown by the same line are to be connected to different machines, so that every house has half its lamps supplied from one machine, and half from another, and so that in case of any machine being temporarily stopped from any cause no single house will be placed in darkness.

All these mains and branches to be laid and fixed, and two pairs of poles brought into each house, and all streets to be made good again.

Working 30 *days.*

As soon as all the above work is complete, and also the fixing of the lamps in the houses (or a reasonable proportion of them to be approved by the Corporation), the machines to be started and a supply of electricity provided for 30 consecutive days and nights, such supply being sufficient for 60,000 lamps (or such less number as may be approved by the Corporation) from sunset to sunrise and for 20,000 from sunrise to sunset, an intermission of 15 minutes being allowed in each circuit twice between sunrise and sunset, but the intermissions in the two currents supplying any one house are never to coincide.

In case of any weakness, defect, or imperfection showing itself during these 30 days, the Telegraph Construction and Maintenance Company are to repair it. At the end of 30 days' satisfactory trial, they shall be held to have completed their undertaking. The Telegraph Construction and Maintenance Company to supply coal, oil, and labour for the trial; but the Corporation to supply water—all rates and taxes chargeable on the works while in progress to be paid by the Corporation.

If, at the completion of all the work except the 30 days' trial there shall not be in the opinion of the Corporation a sufficient number of lamps erected to render a satisfactory trial possible, the Corporation may direct the commencement of the trial to be postponed for a period of not more than two months; but in the event of their directing such a postponement, then (in addition to the price agreed upon) interest is to be paid by them at the rate of 5 per cent. per annum on the amount of the payment which falls due at the end of the 30 days' trial, such interest to count from the date of the completion of the work to the date of the Corporation giving permission to commence the trial.† No such interest, however, shall be claimed if the Telegraph Construction and Maintenance Company have been employed to erect the lamps and internal fittings, and if the delay is caused by any fault of their's.

General.

The whole of the work is to be finished in the most complete and careful manner.

Price.

The price to be paid by the Corporation to the Telegraph Construction and Maintenance Company for the whole of the above work to be two hundred and twenty thousand pounds (£220,000).

Payments to be made as follows:—

£5,000	on signing the contract.		
£20,000	on completion of	£30,000 worth of work	As certified by the Engineer of the Corporation.
£20,000	,,	£50,000 ,,	
£20,000	,,	£75,000 ,,	
£20,000	,,	£100,000 ,,	
£75,000	,,	all the work, except the 30 days' trial.	
£60,000	,,	the 30 days' trial.	

SPECIFICATION AND TENDER No. II.—30,000 LAMPS.

If it is preferred by the Corporation to do half the work first, the above Specification and Tender will be modified as follows:—

General Nature of the Installation.

The installation to consist of the necessary mains, machinery, reserve machinery, and buildings, as specified below, for the continuous supply of a current of electricity to all the houses, warehouses, shops, factories, street lamps, &c., in any two of the four portions into which the district marked on the map sent herewith is divided, sufficient for the maintenance of 30,000 (thirty thousand) Swan lamps of 20 candle-power each during 16 hours out of the 24, and for one-third of that number during the remaining 8 hours.

Electromotive Force.

Same as in Tender No. I.

Dynamos and Engines.

Three dynamos with their engines, as specified in Tender No. I., to be supplied, two to work, one spare.

Exciters and Small Engines.

Four sets instead of six. Otherwise same as No. I.

Boilers.

Twenty-one to be provided of the same kind as specified in No. I., 16 to work, five spare.

Steam Pipes and Connections.

Same as in No. I.

The Engine House and Boiler House.

Same as in No. I. but proportionately smaller, as shown in the tracing, one end wall to be built so that it can be taken down without disturbing the roof in case the building has to be enlarged

Chimney.

To be of the full size for the boilers specified in No. I.

The Traveller.

Same as in No. I.

Regulating Apparatus and other Fittings.

Same as in No. I., but for three dynamos instead of five.

Foundations and Fixing—Mains.

Same as in No. I.

Laying the Mains.

The mains to be laid on any two (to be selected by the Corporation) of the four sets of lines (A, B, C, D,) shown on the map, otherwise same as in No. I., including the provision for supplying each house from two machines.

Working 30 *days.*

This clause to be the same as in No. I., except that for 60,000 lamps, 30,000 must be read, and for 20,000 10,000.

General.

Same as in No. I.

Price.

The price to be paid by the Corporation to the Telegraph Construction and Maintenance Company for the whole of the above work to be one hundred and twenty-six thousand pounds (£126,000).

Payments to be made as follows:—

£3,000	on signing the Contract.			
£10,000	on completion	of	£18,000 worth of work	As certified by the Engineer of the Corporation.
£10,000	,,	,,	£30,000 ,, ,,	
£10,000	,,	,,	£45,000 ,, ,,	
£10,000	,,	,,	£60,000 ,, ,,	
£50,000	,,	,,	all the work except the 30 days' trial.	
£33,000	,,	,,	the 30 days' trial.	

(Signed)

J. E. H. GORDON,

Manager of the Electric Light Department.

(Confirmed)

Chief Engineer.

Manager.

¶ Official confirmation will be sent as soon as the Company's new Act is passed.

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* The ten volt-meters (two to each dynamo) enable the workman in charge of each dynamo to keep the electric pressure constant. The eight registering volt-meters (one to each circuit) inform the manager in the morning of any variation of pressure which may have taken place during the night. The strophometers show the speed of the large engines; the ammeters show the strengths of the exciting currents.

† A good trial can be obtained as soon as 15,000 lamps in all are erected, as the eight circuits can all be temporarily connected into two and attached to each one of the dynamos in turn.

APPENDIX.

Estimated working cost for 60,000 lamps.

The following figures are given for the information and convenience of the Corporation. It is believed that they are correct but they are not in any way guaranteed :—

	Per annum.	*Per annum.*
All the lamps working 2,500 hours per annum. Depreciation and repairs (noting that $\frac{1}{5}$ of the machinery is idle)		£10,000
Coal—		
For 6,360 H. P. for 2.500 hours at $2\frac{3}{4}$ lbs. of coal per I. H. P. per hour. 19,370 tons, which at 10s.[*] per ton makes		9,685
Oil, waste and petty stores		830
Labour—		
[†] Electrician's Department—		
One Chief Electrician	£350	
Two Assistant Electricians at £150 ..	300	
Four Workmen at 26s.	270	
Engineer's Department—		
One Chief Engineer	350	
One Assistant Engineer	150	
Each Shift—To each dynamo, one engine driver at 35s. ; one labourer at 25s. ; one dark room man at 30s. ; four dynamos at work make £18 per week, or £936 per annum. Three shifts of eight hours each [‡] (men of day shift to do all cleaning and assist in minor repairs)	2,808	
[§] Firemen—		
To attend to the boilers which are fired mechanically—		
Two chief firemen at 45s.	236	
Assistant firemen at 28s.—		
First night shift to attend to 30 boilers, 6 men	875	
Second night shift ,, 20 ,, 4 ,,		
Day shift ,, 6 ,, 2 ,,		
[‖] Repairing shop—		
Two fitters at 40s. and 35s. ; one labourer at 25s.	260	
Total Labour ..	——	5,393
Water rate		500
Other rents, rates and taxes		500
Office expenses		500
Renewal of Swan Lamps, at 2s. per 1,000 lamp-hours on 60,000 lamps for 2,500 hours ..		15,000
Total annual expenditure		£42,608

Cost of gas—

60,000 gas-jets (of 12 to 14 candle-power each), each burning 5 cubic feet per hour for 2,500 hours, burn 750,000,000 cubic feet, and with gas at 2s. 6d. per 1,000 cubic feet, cost £93,750

If the consumers are charged the same for each Swan lamp as for each gas-burner, this gives us

Revenue	93,750
Expenditure	42,608
Profit	£51,142

to pay a dividend on a capital expenditure of £220,000 which is equal to $23\frac{3}{16}$ per cent. per annum.

If the Corporation wished to make only 6 per cent. per annum they could supply the electricity (lamp for lamp) at the same price as gas, at less than 2s. 6d. per 1,000 cubic feet, as follows :—

6 per cent. on £220,000 =	£13,200
Working expenses ..	42,608
Required annual revenue ..	£55,808

This would be obtained from 60,000 gas jets burning 750,000,000 cubic feet per annum with gas at 1s. 6d. per 1,000 cubic feet.

Summarising these Results we have

	Lamp of	Cost per hour to the consumer.
Gas at 2s. 6d.	14 candles	·149 penny
	20 candles	·212 ,,
Electricity to pay 6 per cent., 20 candles		·090 ,,

If instead of each lamp (gas or electric) burning 2,500 hours per annum, two or three burning alternately make up the 2,500 hours, the above result will not be altered, the electricity and gas being alike supplied by meter.

---

[*] Good steam coal is here supposed to be used, but the boilers specified will burn slack coal, which is cheaper.

[†] The labour required in the houses is not counted here as the house owners requiring it will be charged with it.

[‡] Here each man will work 56 hours per week of 7 days.

[§] Note that with the coaling arrangements shown in the drawing of the boiler house the coal is delivered mechanically, direct from the store into the hoppers of the steam-stokers.

[‖] For minor repairs only. Large repairs are included in the item "Depreciation and repairs, £10,000."

THE TRANSMISSION OF ENERGY BY BATTERIES OF ELECTRICAL APPARATUS.

By M. JAMES MOSER.

FROM my telephonic experiments, communicated in the sitting of February 12th,[*] there result, concerning the electric transmission of energy, certain general consequences.

In these telephonic experiments I transmitted the electric work produced in a battery of coils to a recipient battery of telephones. On generalising this little model of an electric transmission, I have been led to substitute for each coil any apparatus whatever, generating electromotive energy, and for each telephone any apparatus whatever absorbing such energy.

The use of electric apparatus in batteries, *i.e.*, grouped partly for tension and partly for quantity, offers us the advantage that, whilst preserving the ordinary dimensions of the elementary apparatus and their difference of potential and the speed of the rotatory apparatus it places at our disposal high tensions and great quantities. Both are necessary for transmitting large quantities of work with a good return.

Before entering into details let us consider the following fundamental fact for electric transmission, involved in the laws of Ohm and Joule. If we send through a given conductor a current which we keep at a constant intensity the work lost in this conductor remains likewise constant. Whatever be the number or the arrangement of the recipients transmuting the energy of the current into useful work, the loss in the conductor will always be the same number of kilogrammètres per second. But the loss in the line is not the whole, we must add that produced in the apparatus. If we succeed in keeping constant this second portion, the loss will be constant in its totality. Therefore the more we increase the work collected in the recipients, the smaller becomes the proportion of work lost to the total work, and the greater will be the yield and the nearer its approach to unity. Therefore the useful work and the yield will both go on increasing

We may realise the two conditions of a constant loss in the line and a constant loss in the apparatus by transmitting the energy of one electric battery to another.

To give a definite form to our ideas let us take accumulators. Suppose at first a single accumulator, and direct into it a current the intensity of which is kept always constant at I ampère. The total loss

$$\frac{I^2 R}{g} = P \frac{\text{kilogrammètres}}{\text{seconds}}$$

is composed of the loss in the line and the loss in the apparatus. The counter-electromotive force being e volts, the useful work will be

$$\frac{e I}{g} = U \frac{\text{kilogrammètres}}{\text{seconds}}$$

and the yield will be

$$\frac{U}{U + P}.$$

If instead of a single accumulator we take four, two in tension and two in quantity, we double the counter-electromotive force, but do not change the resistance. Consequently the current being always supposed to have the intensity I, the useful work will be doubled.

---

[*] *L'Académie des Sciences.*

$$\frac{2eI}{g} = 2U \frac{\text{kilogrammètres}}{\text{seconds}}$$

whilst the loss will keep its value, P. The yield will be then

$$\frac{2U}{2U+P}.$$

Consequently by means of $3 \times 3, 4 \times 4, 5 \times 5 \ldots\ldots n \times n$ accumulators, we shall have the useful work $3U$, $4U$, $5U \ldots\ldots\ldots nU$, and the yield

$$\frac{3U}{3U+P}, \quad \frac{4U}{4U+P}, \quad \frac{5U}{5U+P} \ldots \frac{nU}{nU+P}$$

In this construction we have raised the potential at the receiving end of the line e, to ne. To keep constant the quantity of electricity traversing the conductor we must also raise by $(n-1)e$ the initial potential, E, at the sending end of the line, so that the initial difference on the line, $E - e$ may be maintained. But on adding to the generating battery more elements in tension we must add in the same proportion elements in quantity, so that the total initial resistance of the circuit may be re-established.

We have tacitly supposed that the counter-electromotive force of the accumulators remains constant. This supposition is permissible, for if we direct into an accumulator a current, the intensity of which we increase, the counter-electromotive force will increase at first also; then for a certain minimum intensity this force will become sensibly constant. We suppose, then, that the currents traversing the elementary apparatus of the battery have at least this minimum intensity, which is sufficient to bring the counter-electromotive force to its constant maximum.

For transmission on the large scale we are led to construct enormous receptacles with very large surfaces and at very high tension; some near the source of the primary power and the others near its place of employment. The tensions, very high in their totality, will be graduated for consumption.

This construction of battery shows the general conditions to be fulfilled for any electric transmission whatever. The apparatus must be arranged in tension to get the maximum return. But to obtain a great quantity of useful work they must also be grouped in quantity, and transfer a great quantity of electricity.

When we wish to transmit electric energy by means of electro-dynamic machines we proceed in a manner quite analogous. We may employ existing machines with their ordinary speeds and tensions, and group them also in batteries. When we send a current, kept constant, by $1, 2, 3 \ldots\ldots n$ machines, arranged in tension and each preserving its ordinary speed and difference of potential, the useful work will increase from U, $2U$, $3U \ldots\ldots$ to nU. But when arranging these machines in tension we increase the resistance, and consequently the loss in the apparatus. To keep this loss constant we reduce the resistance as we have shown in the case of accumulators by arranging machines also for quantity.

In practice, the introduction of a battery enables us to arrive at a high tension and a large quantity, and, consequently, at a yield and a work required. It is not necessary to construct new machines, and thus, from the present time, experiments will become easier. It is merely necessary to group any available apparatus according to the principles explained above. We retain in these elementary apparatus their dimensions and their normal differences of potential, and in rotatory machines, such as the dynamo-electric, their ordinary speed. Thus accidents caused by too high a speed or an exaggerated internal tension are avoided. Theoretically, this construction of a battery permits us to develop with ease and simplicity the principles to be followed in the transmission of electrical energy.—*Comptes Rendus.*

TO CORRESPONDENTS.

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CORRESPONDENCE.

The Telephone.

In my communications, published in the Review of 19th and 26th August last, wherein I gave a list of patents for telephone receivers for 1881, in which an iron disc in front of the pole of a magnet was used, and in the REVIEW of April 21st I gave a list of those for 1882, to August last, I suggested the advisability of such publication for the benefit of intending investors in telephone patents. It seems, however, that "they have eyes and see not." I beg leave to remark that Bell's patent (No. 611, 1878), Hickley's patent (1,917, 1878), and Hopkins's patent (689, 1882), describe a telephone receiver identical in every essential, that is, an iron disc resting upon several branched poles of a magnet which surround a centre pole which is near to the centre of the iron disc.

The Court of Appeal has decided, it is well known, that Hickley's receiver is an infringement of Bell's first patent, December 9th, No. 4,976 of 1876, because it has an iron disc held down all around its edge, in front of the pole of the magnet.

Common Sense.

May 3rd, 1883.

Trouvé's Bichromate of Potash Batteries.

I have had the pleasure of reading in your scientific and interesting journal a remarkable article, by M. Hospitalier, upon the results which he obtained with my batteries, and which he submitted to the Société de Physique, at its meeting on the 20th ult. You have also published, in the same number, the remarks of M. Reynier on the subject of my communication to the Académie des Sciences, referring to an involuntary error in the figures given for the zinc consumed by 12 elements or two batteries, whilst this figure should be for six elements or one battery.

Your readers not being *au courant* with my communication to the Académie des Sciences, might have supposed that the remarks of M. Reynier applied equally to the figures given by M. Hospitalier, which are, on the contrary, perfectly correct.

This is my reply to the observations of M. Reynier, relating to the bichromate of potash batteries, inserted in the *Comptes-Rendus* :—

"It is true that the figures which I have given in the note to which M. Reynier alludes, refer to 12 couples, and that I have, inadvertently, given as that for the consumption of zinc the figure for six couples. We must therefore consider that the expenditure of zinc for 12 couples is double what was given in my note, *i.e.*, 0·912 kils., or 0·076 kils. per element. I sent a rectification of this error to M. du Moncel, but it arrived too late for making corrections in the *Comptes Rendus*. I also pointed out in this rectification that each battery of six elements (the liquid not having been previously used) gave 118 ampères in short-circuit, with a resistance for each couple of 0·0016 ohms. The resistances, 0·07 ohms and 0·08 ohms, given in the first table of my note, only represents the mean resistance of the couples during operation. Of course, the electromotive force 1·9 volts refers to a single element, and only represents the mean figure."

G. Trouvé.

Paris, *April 6th*, 1883.

Electrical Work in America.

A correspondent sends us the following extract from the letter of one who was formerly in his employ in London :—

"I do not consider that the work is of a higher class here than in England. Take Elliott Bros., or Stroh, or Siemens, as typical London electrical instrument makers, certainly the work is good—much better than when I first came here twelve years ago. The reason of this improvement almost answers the question as to which is the highest class of work, American or European ? In electrical instrument shops the number of American or native-born workmen is very small, but is gradually increasing, this reason being the fact that the number of skilled workmen of German and English birth are greatly in excess of what it was at one time, so the work cannot possibly be better done by Germans or English workmen in this country than it can be done in countries where these men learned their trade. Can it be done cheaper ? Many articles are made cheaper, but not cheaper than the same articles *could* be made in England if the same systems were introduced. How is it that wages are higher here while the cost of living is much about the same as in the old country ? It is due to the protective duty. If free trade was the law here you would see the thousands of English and other Europeans soon returning to their own countries ; therefore, this question naturally presents itself, How can the American employers pay higher wages and make cheaper articles than their English rivals ? We find the men use actually the same material that the English use. The climate is certainly far more severe in this country than in England, and I am sure I can get through more work in England in the summer months than I can here. The conclusion we can arrive at then is this, if work is turned out cheaper here it is the system they work upon that is the cause.

"The wages average $15.00 (fifteen dollars) per week, day work, but a first-class good man can get from $18 to $24. Piece-work is given in all cases where it can be done, and is not given by the half-dozen at the time, like English style, but in hundreds. In the shops of the Western Electric Company (the largest in the country) the piece-work is given out 500 or 1,000 articles at one time. One man takes the lot at a contract price, and engages others to help him. The instructions are in general given in writing, but if a pattern is at hand it is given in preference to a drawing. The work, as a rule, is divided as much as possible.

"There is, of course, a foreman, he is chosen for his well-known ability as a workman and his knowledge of labour-saving tools. Here, then, is the secret—tools. You would be surprised to go through an American factory—tools for everything ; an institution is the tool-maker. He is the best paid man next the foreman ; he is kept constantly going making cutters, taps, slide-rest tools, dies, punches, &c. If any man in the shop has an idea that he can design a tool that will aid him in his work he just makes a rough sketch, the tool-maker will make it for him. There is a lathe and vice for each man, plenty of tools, twist-drills, universal chucks ; there is also emery-wheels, punching-presses, circular shears, shaping machines, and one or two 'turret' or 'monitor' lathes. You would be astonished at the time and labour that can be saved by the use of a monitor lathe.

"Filing is an expensive and laborious job at any time, and should be avoided as far as possible. There is a deal of labour saved here by using emery wheels, run at a high speed. All work that can be punched out of sheet brass should be punched. After the work is punched it simply wants dipping and lacquering ; much can be saved by this method. All work that can be planed or turned should also be done. A wonderful deal of time and labour could be saved by designing patterns with a view to time and trouble they take in finishing. As a rule, draughtsmen give no thought to the labour entailed by the complex form they give to portions of their drawings, and which might be made of much greater simplicity if the workman was consulted. The foreman here gives out the work, tools, &c. ; he also receives and examines the work when finished, and gives notice to the superintendent. This is an official above the foreman, he is the 'boss' ; he attends to all outdoor business, money matters, &c. Another thing I nearly forgot to mention—the hours ; the working hours are ten (10) per day, 60 per week, or rather, 59, as you are given an hour on Saturday."

The Physical Society.

From your issue of May 5th, in so far as it touches the meeting of the Physical Society held on April 28th, it would seem that I had then spoken with even more than my usual cloudiness.

What I thought that I then said, certainly what I wished to say, was as follows in the next paragraph :—

"*I do not think that Mr. Bottomley's good experiment of cutting through a block of ice by a loaded wire and the healing of the ice above the wire, gives an experimental proof of the undoubted fact that in the case of ice increased pressure lowers the freezing point.*"

My reason for this conclusion is, as I stated, that a silk cord of the same thickness as the wire and weighted to the same amount scarcely enters the ice at all. This comparative experiment, which I have been in the habit of showing to my students for at least ten years, but which I do not claim as my own (for I have indeed forgotten whether it is mine or not), seems to me to prove that the main effect of cutting the ice is due to heat conduction by the wire.

But about the healing of the ice above the wire ?

It is well known that clean surfaces of ice at 0° C. will cohere when gently pressed together. It is however, equally well known that clean surfaces of butter, of lead, and even of glass will also so cohere. In the latter case, at all events, the idea of fusion and solidification (if we use the terms in their ordinary sense) must be discarded. Therefore, I argued and argue, that there is no need to have recourse to the theory of regelation to explain Mr. Bottomley's experiment. I do not know that such cohesion ever takes place between surfaces of true crystals, although it may take place between masses of crystals. If a bar of ice be supported at its ends, and the loaded wire loop be thrown over its middle, there will be, obviously, a horizontal pressure urging the two cheeks of the wound together as soon as the wire has cut in. To borrow a surgical expression, I conceive the wound to heal by "first intention,"some suppose suppuration. If the block be so supported that there is the least tendency for the wound to gape, healing does not occur. Nor does it occur when the block stands on a flat horizontal surface.

Fred. Guthrie.

Prospects of Electric Lighting.

I must apologise to Mr. A. J. Jarman for speaking of him as an outsider, in my letter under the above head, which you kindly inserted in your issue of the 21st ult. Not having any knowledge of Mr. Jarman, I simply judged from his remarks in your previous issue, and here I find I was in error.

While, however, Mr. Jarman does not think that I have disproved his remarks, I am glad to find that he endorses almost the whole of mine. While, therefore, we are pretty well agreed as to facts, we are quite at issue as to the conclusions to be drawn therefrom, and I think we need not go far to find the reason for this. It is simply that we are looking at the question from a different point of view.

Mr. Jarman's letter in your issue of the 28th ult. is a more direct attack upon the promoters and directorate of the "companies" than his previous one, and his other remarks show that it is at the present organisations his criticisms are aimed, rather than at the practical science of electric lighting itself.

Whether the speculative fever of 1882 and the present financial depression are natural and necessary phases, or otherwise, in the development of the new industry is a very wide question, and must be studied in the light of history; but supposing the whole of the present companies to be cleared away and become a thing of the past, as Mr. Jarman appears to think they will, does he also think that the practical science of electric lighting will go with them? This is what he appears to infer, but will he support a direct statement of this kind?

And if not, then it would appear that he believes, as I believe, that underneath the surface and distinct from the passing phases of speculations and organisations is a something which I will again call the "practical science of electric lighting," which possesses a power and vitality of its own, enabling it not merely to outlive what I have named the "passing phases," but which rises to higher perfection through and in virtue of these passing phases.

In my last letter I endeavoured to point out one or two directions in which the present organisations or "companies" had directly benefited the "practical science of electric lighting." I pointed out that a large amount of the work was of the nature of experiment, and it is under this head that Mr. Jarman appears to take the greatest exception to my remarks; but, as I have just now said, this is simply because we are looking at the question from different points of view. He does not venture to assert that the experimenting has been a retrograde movement in the interests of practical science, but he objects to it on the ground that the public were asked to subscribe their money for a definite system, and not for experimenting.

Now, I have never expressed an opinion as to the right or wrong in the matter of the formation of the "companies," nor have I made any assertion as to the nature of the inducements held out in the various prospectuses; but what I do assert is that the science has been and is passing through a very necessary experimental stage, and that these experiments are already bearing fruit in the shape of better workmanship, increased knowledge, and a wide application of the science.

W. Kingsland.

Leeds, *May 8th*, 1883.

The Society of Telegraph Engineers—Metal Microphones.

I did not happen to be present at the time the communication from Professor Silvanus Thompson was read at the last meeting of the above-named society, and therefore could not make any remarks upon it; but I see from your account of the proceedings that he mentions that Mr. Theiler has used a metal microphone as a transmitter, and adds that I cannot therefore claim to be the first in this respect. As I am not aware of having made any such claim, it does not signify. I know that M. Theiler, and probably others, have "patented" a metal microphone transmitter with a single pair of contacts; a Hughes microphone, in fact, wherein metal takes the place of carbon. But Professor Hughes himself went even further than this in his original experiments, a fact I am also well aware of. What I claim is the combination and arrangement of the metals in the form of gratings and grains, an arrangement which is the result of invention and experiment. The metal microphones hitherto experimented with by Mr. Theiler, Major Barney and Professor Thompson were metal microphones pure and simple, that is to say, the original form of Professor Hughes; but I have no hesitation in saying, as the result of experience, that such microphones will not be practicable transmitters for any length of time, owing to the shortness of the discharging distance with metals as compared with carbon (a fact pointed out in my paper to the Society on March 8th, and also to the "burning" of the points. At the last meeting of the Society I defined, from my experiments, the conditions required to make metals practicable as a telephone transmitter, namely: (1), numerous contact points; (2), lightness of the metal masses; (3), reduction of sound vibrations to something small, that is to say, smaller than in the case of carbon. Such conditions are fulfilled in the transmitters which I have patented. These conditions were omitted in your report, which fact must be my apology for trespassing on your valuable space. Professor Thompson obtained good results with a single silver contact. It may therefore be interesting to add that a silver gauze gives me the worst results. Iron is, perhaps, one of the best metals I have yet tried; platinum gauze operates, but not quite so well as iron.

The distinction between single-point or elementary metal microphones and complex ones, such as I have mentioned above—a distinction which makes the difference between a practical and impractical instrument—is also applicable to the deduction by Mr. Shelford Bidwell that metal microphones will not properly transmit speech. This deduction is, I believe, perfectly correct in reference to the single-point metal microphones Mr. Bidwell and others have experimented with, but not, I think, with other forms. It is the misfortune of metals that they have hitherto been used under the same conditions as carbon.

While about it, I may as well point out—if you will allow me, sir—that the repulsion proved to exist between microphone points when the discharge passes is an important element in the view I have taken of microphone action. It appears to play the part of a spring or "buffer" reacting on the points, when, by sonorous vibration, they approach each other through the infinitesimally thin conductive film which fills up the discharging distance. This repulsion also helps us to explain the "reversability" of the microphone, or its action as a receiver. In order to prove that metal microphones are also reversible, and that the phenomenon is not peculiar to carbon ones, I have had a metal microphone receiver constructed and exhibited it to the society. It consisted of a loose pile of wire gauze-pieces laid one above another in a case, between two electrodes which conveyed the current through the pile. The head of the pile bore upon the centre of a mica diaphragm by means of a small plug of cork, and the device demonstrated unmistakably that metal microphones are also reversible, by virtue, as it appears, of the repulsion due to the varying current setting the points in vibration.

J. Munro.

Edison Indian and Colonial Electric Company (Limited).

Can you inform me if the above company is in any special way exempted from complying with the Companies Acts as regards registration of its returns. Failing to find in your columns any record of the filing of the statutory return, I recently searched the file of the company at Somerset House, and although registered on June 13th, 1882, no return has as yet been made.

Inquirer.

[The return of all companies registered under the Companies Acts should be made within fourteen days of the statutory meeting, held within four months of registration; and we believe that a company is liable to a fine not exceeding £5 for each day in default.—EDS. ELEC. REV.]

Electrical Distribution.

In the ELECTRICAL REVIEW of April 21st you did us the honour to describe our secondary generators, and, after having compared them with the means previously known for the house-to-house distribution of electricity, you invited your readers to give their views on our invention, with any results of former experiments in the same direction.

The discussion being thus open, we have thought that the position of the question should be clearly stated, and therefore request you will be kind enough to give publicity to the following remarks.

We propose first to define the several conditions of the problem, much as they were indicated by your contemporary, "Iron," on the 27th April, and then to examine how far the various systems afford a solution of these conditions.

The conditions under which the general and practical employment of this marvellous agent, electricity, would be perfect may be described as follows:—

1st. The cheap mechanical production of electrical currents, and that wherever possible by the utilisation of natural forces.

2nd. The distribution at a great distance, not of an *electrical current* but of *electrical energy*, which is of widely different importance; for a given current has special properties, and consumers should not be limited to the employment of special apparatus designed for any particular current.

3rd. The distribution of electrical energy without permanent danger to consumers, and as far as possible without limit to the extent of that distribution.

4th. And lastly, that the consumer should be able practically to transform electrical energy into currents of every kind, and consequently adapted to every employment, such as lighting by incandescence or voltaic arc, chemical processes, and motive power.

Without describing the well-known system of Mr. Edison, we will merely remark that this system requires a current of large quantity, produced by a dynamo machine placed in a central factory, around which consumers are supplied within a small radius, the object being to distribute by derivation the quantity of electricity sufficient for supplying the lamps.

By this system the first part of condition (1) may be fulfilled; the second part on the contrary finds by it no solution.

The third condition is reversed, for if currents, large in quantity only, are not dangerous, their production is necessarily limited by the impossibility to convey them without loss to a distance.

As regards the solution of the fourth condition this has not even been touched upon in the Edison system.

We need not inquire what is the value of the work done by the distribution of Mr. Edison. We wish simply to establish the conditions of his system as compared with the ideal conditions we have above enumerated.

Another system for the distribution of electricity, which Mr. Brush has pushed to its extreme limits, consists in the employment of a current of sufficient tension to overcome the sum of the resistances of the apparatus of consumption, or lamps placed consecutively on the same circuit.

Since currents of high tension may, by this system, be conveyed to a considerable distance without any important loss of energy, the condition (1) would be fulfilled by this system; but the permanent danger to consumers by the employment of such currents prevents the fulfilment of condition (3).

It is obvious that condition (2) is not met by this system.

An attempt has been made by this method to comply with condition (4); it consists in substituting for the lamps during the day on the circuits intended for public lighting, accumulators, which, placed at the different houses, would thus store a certain amount of electrical energy, which the consumer might, by coupling these reservoirs differently, dispose of as he pleases.

But it must not be forgotten that the available work obtainable from the accumulator is absolutely dependent upon the quantity of the current feeding it.

Although currents of high tension require only conductors of small diameter, it is necessary that the quantity of the current conveyed by these same conductors should be relatively small.

Let us inquire what available work could be produced from a Brush machine constructed to feed 40 Brush lamps placed in series on a circuit of considerable length. The production of quantity by one of these machines being 10 coulombs per second, the *maximum work* stored by the accumulators would be 600 coulombs per minute, and 36,000 per hour, or for 10 hours 360,000 coulombs; but the best constructed incandescent lamp would require 1·3 per second, or 4,680 coulombs per hour, or 46,800 for 10 hours.

It follows that a Brush machine capable of supplying 40 arc lamps, could only store by means of accumulators the necessary current during the same time to feed 10 Swan lamps.

It is needless to enlarge upon the enormous expense attending such a system of transformation of energy, and we may therefore say at once that the Brush system offers no practical solution of condition (4).

With respect to the charging of accumulators placed at a considerable distance from the electrical source, the Siemens system would offer substantial advantages as compared with that of Mr. Brush, as it consists in placing in derivation arc lamps requiring the employment of a current of large quantity, the potential being necessarily proportioned only to the resistance of the circuit. It would result from this disposition that from the work done by such machines an accumulator would give a far higher result as to the energy stored.

Notwithstanding, however, that this solution of condition (4) is better than that offered by the system Brush, it is far from being complete, and further, such currents, in order to traverse long distances, being necessarily high in potential, as well as large in quantity, would be most dangerous.

You have, sir, in your article, pointed to the systems of Mr. Fuller and of Professors Houston and Thomson, as bearing directly upon our invention.

Although these systems have never been practically applied, and it is consequently difficult to determine the conditions they might fulfil, it is clear, first of all, that they are based upon a principle totally different to ours, and then it is evident from their claims that their object was to furnish special currents destined for specially described lamps, under the name, in one instance, of vibrating lamps.

We have said that the principle upon which the construction of the apparatus of these gentlemen is based is absolutely different from ours; in effect it is only necessary to read their patents in order to see that the determining action of the induced current in their machines is the inversion of the magnetic poles in the electro-magnets fed by alternating currents.

If we had to discuss the value of their system it would be easy for us to prove its impracticability; it will suffice merely to notice the great heating action set up in a cylindrical core under the influence of the changes of polarity; but as we have just said no attempt having been made to prove the practical value of these systems, we postpone till another occasion their further discussion.

Allow us to return now to our secondary generators. We would remark that they are constructed on the principle of the direct generation of electrical currents on a bobbin by the influence of the movement of the current produced in an interior circuit which traverses this bobbin, and that before the construction of such instruments was possible it was first of all indispensable to recognise the fact, that the current generated in a secondary coil inclosing a primary is NOT, as has been supposed up to now, due to the *transformation* of the primary current.

It was, therefore, after having proved that the influence of the secondary current generated in the secondary circuit had no other effect on the current traversing the primary than to offer to it a resistance, proportional to the electromotive force developed in the secondary circuit, and after having determined that the quantity of the generated current was proportioned only to the *quantity* of the primary current, that we have been able to arrive at the idea of generating on an unlimited number of apparatus placed on the same circuit electrical currents of independent value, and in direct relation with the construction of the secondary coils of these apparatus.

The realisation of this idea could, in fact, only be fulfilled on condition that the electrical energy was constant over the whole circuit without any reference to the number of apparatus which it had to traverse.

We would here beg to mention an experiment which you witnessed, but the object of which seems to have escaped you. When showing that the secondary circuit of a Ruhmkorff coil traversed by a current of 30,000 volts could be touched without inconvenience when it is metallically closed, we had no wish to establish any kind of comparison with the secondary currents generated on our machine, but simply to prove to you that any circuit *metallically closed* could be touched in any part of it without danger, and also to show you that the electromotive force of the currents traversing our *primary circuit*, which is exactly under these conditions, need not be limited.

Hence the possibility to convey by our primary circuit an amount of electrical energy corresponding to several thousand horse-power, which energy, by means of our Secondary Generators, could be distributed in any proportions to consumers.

Since we thus show the possibility of distributing and subdividing natural forces, it may not be inappropriate to inquire what would be the effect of distance on the work distributed. Let us take as an example a current of 500 volts by 10 ampères, the work expended for producing such a current would be about 500 kilogrammètres.

Let us suppose that this current to be distributed has to traverse a circuit formed of a copper wire of about 4 mm. diameter, and of the length of 5 kilomètres; the work absorbed by this circuit will be equal to the square of the resistance, multiplied by the quantity of the current which traverses it, and divided by 746; or

$$\mathrm{W} = \frac{\mathrm{C}^2 \times \mathrm{R}}{746}$$

The resistance of the conductor under these conditions being 5 ohms, the work lost would be about

$$\frac{10^2 \times 5}{746}$$

or about 50 kilogrammètres, or 10 per cent. of the initial work; but if along the same circuit we cause a current of 20,000 volts and 10 ampères to flow, the work produced by this current would be

$$\frac{20{,}000 \times 10}{746} \times 75$$

or nearly 20,000 kilogrammètres, for the loss occasioned by the resistance of the circuit would always remain

$$\frac{\mathrm{C}^2 \times \mathrm{R}}{746}$$

or about 50 kilogrammètres; and thus the loss caused by the resistance of the conductor would be gradually diminished with the work done, proportionately with the increase of the work transmitted.

In reverting to the experiments we must remark that during the last three months it has been proved daily that two secondary generators placed consecutively on the same circuit of three millimetres diameter traversed by a current of 13 ampères and taken from a circuit of a Siemens machine, supply, the one, a current of 40 ampères feeding twenty-six incandescent lamps, and the other (two of its bobbins being coupled for tension) a Jablochkoff arc lamp, and the remaining two columns forming separate circuits coupled for quantity, the one feeding five Swan lamps, and the other a motor, which, taking a synchronous movement from the alternativeness of the current it traverses, allows the commutation of the current furnished by the secondary generator, and therefore its employment for charging accumulators, which thus find their only appropriate place in the future.

We would repeat here by way of reminder that the soft iron cores, which are movable in the bobbins, allow the consumer to regulate the quantity of current so as to produce luminous effects of varying intensity.

We would also observe that the secondary currents being used on the spot where they are generated, it will be always economical to employ low potential currents, which could not possibly be dangerous.

The four conditions we have mentioned are thus absolutely fulfilled by our system and apparatus.

Large sums have been expended in order to bring the several systems of electrical lighting to the position they occupy to-day, and although by these systems it is impossible to produce the effects we obtain, the important part of the labours already accomplished will certainly find applications in our system of absolute distribution.

In conclusion, we claim to have invented a convenient, easy, and practical method of employing electrical energy as a means of transporting natural forces to a great distance, and allowing of their subdivision according to the requirements or will of consumers.

L. Gaulard.
E. Dixon Gibbs.

London, *May 1st*, 1883.

[The foregoing letter from Messrs. Gaulard & Gibbs is somewhat remarkable for its length, and it does not set forth any argument to show that their system is anything other than the use of induction coils pure and simple, but of special construction. We state distinctly that the apparatus of Fuller and that of Messrs. Houston & Thomson are identical *in principle* with the system now under discussion. Whatever roundabout way Messrs. Gaulard and Gibbs may adopt in describing their induction coil—confusing enough and perhaps misleading to unscientific readers—they cannot escape the fact that their secondary currents are produced in precisely the same manner as those obtained by the above-mentioned American electrician.

In regard to the experiment which we witnessed, we beg to say to Messrs. Gaulard & Gibbs that a circuit such as theirs, *metallically* closed, is not necessarily free from danger when touched; in fact, it depends upon the difference of potential between the two points touched, as to whether it is dangerous or not. We should like to see these gentlemen try the Spottiswoode induction coil as follows: —Instead of putting the discharge-points of the secondary coil together and thus making a short circuit, let them insert a considerable wire resistance between these discharge-points and then touch the terminals of the secondary coil. Although the circuit is *metallically* closed, we fancy the result of touching the points referred to would materially enlarge the views held by Messrs. Gaulard & Gibbs.

The calculation concerning the 40-light "Brush" machine is utterly fallacious. Our correspondents evidently lose sight of the fact that when accumulators are being charged the total resistance in circuit is practically that of the machine only, and the number of coulombs per sec. would therefore be many times in excess of that which would be obtained when 40 arc lamps form part of the circuit. We trust that the designers of the "secondary generators" will not think we have written our reply in order to cast any disparagement on their pretty and interesting apparatus; on the contrary, we wish them the success they deserve.—EDS. ELEC. REV.]

NOTES.

Electric Lighting.—We understand that the first order for electric lighting apparatus received from the other side of the Atlantic has been placed in the hands of the Gülcher Electric Light Company, by Messrs. Thos. Rouet and Co., 65, Fenchurch Street. The goods, which are for an installation of the Crookes' incandescence system, have been shipped this week to Halifax, Nova Scotia.

In our last issue we announced the end of the electric lighting experiment at Aberdeen. The following is the report prepared by the special sub-committee having charge of the experiment:—"We beg to report that the time granted by the town council for the experiment in electric lighting has now expired. The experiment was commenced on the 23rd day of December, and has been carried on with little or no interruption since. Everything in connection with the experiment has been as economically carried out as possible, and the cost of the whole will be as follows:

"The construction of plant, including a sum of £60 for taking down the apparatus and reconstructing the buildings at College Street will be	£186 14 9
"Maintenance and wages, including the Brush Company's charges	222 19 3
"Total cost of experiment	£409 14 0

The amount arising from a number of the gas-lamps not being lighted, as per report from the inspector of lighting, is £34 11s., reducing the maintenance to £188 8s. 3d., and the whole expenditure in connection with the experiment to £375 3s."

To consider the terms of the Provisional Electric Lighting Order the town councillors of Aberdeen gathered themselves together on Wednesday week. The proposal already lodged embraces the whole city, but after mature deliberation on Wednesday it was resolved to recommend a modification of this proposal, so that the area embraced should only include Market Street, Union Street, eastward from that point, Castle Street, and Marischal Street. The intention at the outset is, should an order be allowed, to limit the lighting to Market Street, further extensions to be determined by the demand.

A proposal has been made to light up Albert Square and the vicinity of the Town Hall (Manchester) by means of Mr. Charles Lever's electric arc lamps.

At the Lambeth vestry meeting last week a letter was received from Mr. Gordon, manager of the Telegraph Construction and Maintenance Company (Limited), stating that the company was prepared to undertake the business of electric light contractors. He expressed the opinion that they would be able to carry out the lighting at a cost considerably less than that of gas. The letter was referred to the special lighting committee.

The Newington vestry met last week, when it was intimated that a letter had been received from Mr. J. A. Giles, of Lorrimore Road, informing the vestry that it was the intention of the inhabitants to oppose the application to the Board of Trade for a licence to light a portion of the parish with electricity, on the ground that it was unnecessary, uncalled for, and opposed to the wishes of the majority of the ratepayers.

The Wandsworth Board of Works at their meeting last week, agreed to the report of the General Purposes Committee approving of the provisional order of the Board of Trade with certain modifications, among them being that the special capital to be named should be £14,000 and the deposit £1,000.

The Glasgow Town Council met last week, when the Town Clerk (Dr. Marwick) in explaining the provisional order lodged with the Board of Trade, said the Board of Trade entertained very stringent views with regard to the matter, and insisted on the provisional orders being drawn on the same lines, both as regards electric companies and corporations, the effect of which would be that if the Corporation of Glasgow adopted the order, the Board of Trade would insist on their being under obligation to introduce within a period of two years electric light to a particular area of Glasgow; in any circumstances they would be bound to provide electric light. If they made an arrangement with outside companies, and these companies failed to supply electric light and incurred damages in consequence, no doubt the companies would in the first instance be responsible; but in the event of them failing to pay the penalties there was reason to fear that the responsibility would come on the corporation. The result was, that at a meeting of the representatives of Glasgow, Manchester, Nottingham, and Wigan, held in London recently, a resolution was adopted to the effect that any further prosecution of the provisional orders under the conditions proposed by the Board of Trade be abandoned, and that it be left to the discretion of Mr. Pritchard to take such action as he might think best to bring the matter before the various local authorities of the kingdom. If the Board of Trade ignored the corporations and put the power to supply electric light into the hands of speculative companies, the foundation would be laid for the corporations going direct to Government, and, if they failed to get redress, of making application to Parliament. The resolution adopted at the meeting of the representatives referred to became the judgment of the council.

We understand that the new premises recently fitted up for the offices of the *Irish Times* in Westmoreland Street, Dublin, are to be lighted throughout on the incandescent system of electric lighting. The installation is to be erected by Messrs. Siemens, and will consist of 150 Swan lamps of 20 C. P. each, worked by an alternate-current machine and an exciter. The lamps will be arranged in four circuits so that one or more circuits may be cut off at pleasure, and each lamp will be provided with a switch for putting the current on or off as occasion may require. Safety plugs are also to be inserted where necessary. The dynamos will be driven by a 12 H. P. Crossley gas-engine; suitable counter-shafting, as also a fly-wheel on the exciter being provided for the purpose of overcoming the usual unsteadiness of this class of engine. The installation has been ordered through, and will be carried out under, the superintendence of Mr. J. Angelo Fahie, of Dublin, Mem. Soc. T. E. and of Elec.

In moving the adoption of the report of the Watch Committee at Chesterfield this week, Alderman Wood said he believed the time had come when the corporation should make a hard and fast contract with Messrs. Hammond & Co. as regards the electric lighting. The committee now certified that the lighting of the town was complete, and to their satisfaction. At first the town was lighted by means of the arc lamps, but now it was almost entirely illuminated by the incandescent light. The corporation had a certain advantage in adopting the incandescent system. The lamps were kept alight all night, whereas half of the arc lamps were extinguished at midnight. The arc lights were the most suitable for the illumination of large spaces; but the incandescent lamps were far preferable for narrow and winding streets. One hundred and fifty-two incandescent lamps are in use in the town, and in a short time St. Mary's Gate and Beetwell Street will be lighted on that system. The Mayor, in answer to a question, said the contract with Messrs. Hammond & Co. was for £885 for the year. The gas cost £50 more. We have referred to the lighting of this town by electricity on several occasions, and the result now appears very satisfactory. The arrangements are so complete that a breakdown is scarcely likely to occur, as two engines and two 40-light Brush machines are always running at half power. In the event of one giving way the other can be worked up to its full capacity.

The Edinburgh failure was once more dragged from oblivion by Dr. Beveridge in the course of his speech at the Aberdeen Town Council meeting on Monday last. He said Bailie Macdonald was quite right in saying that the lighting in Aberdeen had been better than in Edinburgh. But the lighting in Edinburgh had been of the most miserable character, and it was not saying very much for the lighting that it had been better in Aberdeen than in Edinburgh. Aberdeen had not been equal to anything like what might be seen in London, and it was certainly very inferior to what he had seen in Paris. He was of opinion that the experiment had been in a great measure a failure. The cost had been heavy, and the gas lighting save trifling. It was almost a pity that some other of the companies were not tried as well as the Brush Company.

The Union Steamship Company of New Zealand, which has had two of its steamers fitted with Siemens dynamos and Swan lamps, and other two with the Edison system, has entrusted the lighting of its new mail steamer, the *Takapuna*, now finishing at Barrow, to the Edison Electric Light Company. The comparative merits of the two systems of lighting having thus been tested on board four steamers, the preference accorded to the Edison Company in this instance is inferentially complimentary to that system.

Reviewers Reviewed.—In our issue of February 17th we published a "note" which was headed "The Misdeeds of Electricity," and which contained two most absurd statements, noteworthy mainly on account of their absurdity, which had been given in a leading Parisian journal. A New York contemporary, which has already changed its title and style, although the commencement of its existence is of very recent date, is so obtuse as to review our geographical knowledge as exhibited in this "note," notwithstanding the fact that it was credited to its original source. It was republished obviously to indicate what nonsensical stories were sometimes told regarding the accidents which occasionally occur through the employment of electricity. If our contemporaneous editor turns his attention to editing his own paper, rather than to making mistakes in quoting from others, it may conduce somewhat to the permanency of the former. We would also observe, now that we have alluded to our contemporary, that when we borrow we make it, as far as possible, the rule to acknowledge the source from whence the information was originally taken. Our would-be critic would probably add some authority to his publication were he equally honest.

Relative Costs of Street Lighting by Electricity and Gas in New York.—New contracts for lighting the streets of the great city of New York have just been awarded, beginning May 1. The price to be paid for gas lighting for the closely inhabited part of the city, in which by far the larger portion of the lamps are located, is $17.50 per year per light. In the outskirts and sparsely inhabited regions, from $19.50 to $32 per gas light is to be paid. The use of electric lights, says the *Scientific American*, will be continued in portions of Broadway, Fifth Ave., including certain parks and squares, in all a length of about six miles, at 70 cents. per night per light. Arc lights are used of the Brush Company, also of the United States Company's styles. Each electric light displaces six gaslights. The contract price for each electric light amounts to $225 per year per light, which is rather more than double the cost of gas in the chief parts of the city. It is conceded, however, that the quantity of light furnished by an electric lamp is much greater and better than that yielded by the six displaced and dingy gas lamps. The streets that are illuminated by the electric light present an attractive and brilliant appearance. Reckoned by quantity of light supplied, the arc lamps are far cheaper than gas. Not so, however, with the incandescent system—the Edison system, for example, which is not at present used for street lighting in New York. Each small Edison light, not quite equal in force to an ordinary gas light, costs rather more than gas.

The Electric Light Syndicate Company (Limited).—A compulsory winding up order having been made on the 6th ult. by Mr. Justice Fry, Mr. Justice Pearson has appointed Mr. W. C. Cooper, of the firm of W. C. Cooper and Co., the official liquidator of the company.

Storage Batteries.—Professor Henry Morton recently read a paper on the storage of electricity to the members of the New York Electrical Society, at the Stevens Institute of Technology, in Hoboken. Edison incandescent lamps lighted the room, a two horse-power Weston electric motor stood on the lecture-table, and the lamps and motor were furnished with electricity from the Faure Sellon-Volckmar accumulators. Professor Morton briefly described the principles involved in the present methods of electrical storage. The experiments made by the lecturer showed that each cell in the battery would yield a continuous current of about 32 ampères for nine hours, with an electromotive force of about two and two-tenths volts, a quantity of current sufficient to supply 44 of the Edison incandescent lamps ot 16-candle power, without employing more than 50 cells to secure sufficient electromotive force to overcome the resistance of the lamps. Each cell weighed only 80 pounds when ready for work, so that for each light of 16 candles, burning one hour, 10 pounds of battery should be provided, if it were used solely as a reservoir to contain the current required. Experiments with the lights in the room were made to show that the battery in many cases would only be required to act as a regulator, and by connecting the dynamo with the battery, so that any excess of current could flow into it, or any deficiency be supplied by it, the lights burned perfectly steadily.

Enlargement of the General Post Office Telegraph Department.—In the House of Commons on Monday, Mr. Fawcett, in reply to Mr. Ritchie, said the height of the floor of the additional story by which it was proposed to enlarge the accommodation of the Telegraph department of the General Post Office was 76 feet above the pavement; that the maximum number of persons employed in the entire building was 2,500, of whom not more than 2,000 would be in the building at the same time; that the building was fireproof, and that every precaution had been taken to provide against fire. The means of exit were so good that it was estimated that, in ten minutes, the entire staff employed in the business part of the day could find their way out.

Telegraphic Communication with Bokhara.—The Turkestan official gazette announces that the telegraph cable now ending at Kalta Kourgan will shortly be continued to Bokhara.

Telegraphic Communication with Ireland.—The Post Office notified that on Wednesday week last one of the cables between England and Ireland was to be taken up for repairs. A great delay in the transmission of messages was consequently anticipated, particularly as the present trials in Dublin are so fully telegraphed for the Press.

Overhead Telegraph Wires.—The Shoreditch vestry has decided to send a deputation to the Home Secretary on the subject of the fast increasing numbers of overhead telegraphic and telephonic wires in the metropolis. The deputation is to urge that the local authorities should be trusted with the powers of control. Several other vestries concur, and will join the deputation.

[As our readers are aware a wire connot be erected in at least one place—viz., Dundee, until the route, fixtures, and wire have been approved of by the Plans and Works Committee of the Town Council.]

Proposed Telephone Communication in Lambeth.—The Metropolitan Board of Works having received a letter from the London and Globe Telephone and Maintenance Company (Limited), requesting permission to run their wires and cables on the outside ledge of Lambeth and Vauxhall Bridges to the south side of the river Thames, it was submitted to the board meeting yesterday week, and was referred to the Works Committee.

Telephonic.—In our last issue, writes the *Bullionist*, we adverted to the complaints which have recently been so rife in the City, regarding the inadequate service rendered to its subscribers by the United Telephone Company. Since we last wrote these complaints have developed into widespread discontent. For the benefit of our readers who may be subscribers to the United Telephone Company we will enlighten them as to the real cause of the delays to intercommunication during the last few days. It appears that the London Globe Telephone Company have rented the roof of the Wool Exchange in Coleman Street as a central "way lead" for their wires, which they are now erecting with a view to their early commencement of business. This roof has hitherto been largely used for the same purpose by the United Company, which after due notice from its rival refused to remove or alter their position. The Globe Telephone officials thereupon summarily cut their opponents' wires, and thus stopped connection between 200 of their subscribers. Considering the deliberate attempt the United Company made last year to prevent the establishment of the London and Globe, the action of the latter company can only be considered a *quid pro quo.*

Electrical Power.—An interesting application of electrical power is at present to be seen at the works of the Railway and Electric Appliances Company, Polmadie. One of Kennedy's dynamo machines is used as a generator, and the power thus developed is transmitted to another dynamo, which in its turn works two 60-feet line shafts, driving a couple of planing machines, two vertical machines, a slotting machine, two boring mills, a screwing machine, and five large slide rest lathes. The dynamo machines employed in this way are the invention of Mr. Kennedy, the electrician to the company, and they have only been perfected within the last month or two.

Prospective.—The proprietors of *Health* have arranged with W. L. Carpenter, Esq., B.A., B.Sc., F.C.S., for a series of papers on "Electricity, and its Application to Health."

Proposed Electric Railway at the Wimbledon Annual Rifle Meeting.—The council of the National Rifle Association have entered into a contract with the Electric Motor Syndicate, (Limited,) for laying down an Electric Railway at the forthcoming annual meeting at Wimbledon Camp. The railway is to be about one mile in length and the carriages are to be fitted with Piot's electric motor.

Ayrton & Perry v. Paterson & Co.—We have received a circular from Messrs. Paterson & Cooper, the defendants in this action, in which it is stated that, owing to their arrangements with Messrs. Ayrton & Perry, with reference to the manufacture of the instruments of the latter by them, on the plaintiffs' account having ceased, they propose henceforth to manufacture them on their own account, and to issue them to the public without their being first tested or calibrated by Messrs. Ayrton & Perry. Consequently no responsibility will attach to those gentlemen with regard to the instruments supplied by Messrs. Paterson & Cooper in future.

Professor Tyndall and the Board of Trade.—Professor Tyndall has resigned the office of scientific adviser to the Board of Trade and the lighthouse authorities, and has also withdrawn from the Special Committee appointed by the Board of Trade to investigate the subject of the best illuminants for lighthouses. The Professor's resignation is the result, it is said, of a difference of opinion between the professor and the department on the constitution of a committee of inquiry into the properties of a particular illuminating power.

The Patents Bill.—Owing to representations which have been made to the Government, it is understood that an earnest endeavour will be made to deal with the Patents Bill during the present session.

NEW COMPANY REGISTERED.

Brazil and River Plate Public Works Company (Limited).—Capital £200,000, in £100 shares. Objects: In the Brazils, the River Plate, and elsewhere, to construct and maintain public works, including telegraphs, electric works, or works for the supply, use, or application of electricity, or electric light or power. Signatories (with one share each): R. G. Graham, 7, Finch Lane; * Sir William Magnay, Bart., 8, Milton Street, Dorset Square; Thomas Jervis, 68, Cheapside; T. Grover, 17, Devonshire Square, E.C.; W. W. R. Burgess, 11, Sherborne Street, Blandford Square; * Luke Bishop, 14, Belgrave Road, St. John's Wood; A. J. Davis, 21, The Avenue, Hornsey Park. Directing qualification: £200 in shares or stock; remuneration, £100 per annum to each director. Rear-Admiral Brookes, is appointed a director. Registered 4th inst. by Walter Webb & Co., 23, Queen Victoria Street, E.C.

* Signatories denoted by an asterisk are also directors.

OFFICIAL RETURNS OF ELECTRIC COMPANIES.

French Metropolitan General Electric Company (Limited).—The first return of this company, made up to the 4th ult., was filed on the 1st inst. The nominal capital is £1,200,000, in 60,000 shares of £20 each. Eighty-three shares have been taken up, and the sum of £1 per share has been called and paid. Registered office, 71, Queen Street, E.C.

French Electrical Power Storage Company (Limited).—The first return of this company, made up to the 4th ult., was filed on the 1st inst. The nominal capital is £1,075,000, divided into 75,000 ordinary shares of £1 each, and 100,000 preference shares of £10 each; 5,000 ordinary and 80,000 preference shares have been taken up, and a call of 5s. per share has been made upon the former and £10 per share upon the latter. The total calls paid amount to £801,343 15s. Registered office, 71, Queen Street, E.C.

North-Eastern Electric Light and Power Company (Limited).—The first return of this company, made up to February 27th, was filed on the 7th inst. The nominal capital is £100,000, divided into 5,000 preference and 15,000 ordinary shares of £5 each; 140 ordinary shares have been allotted, and £2 per share has been called and paid upon each. Registered office, 61, John Street, Sunderland.

Midland Electric Light and Power Company (Limited).—The second return of this company was made up and filed on the 4th inst. The nominal capital is £50,000 in £10 shares. The number of shares taken up is seven, and upon these a call of £5 per share has been made. The calls paid amount to £30, leaving £5 unpaid. Office, 33, Waterloo Street, Birmingham.

NEW PATENTS—1883.

2082. "Galvanic batteries." W. E. T. Dawson. Dated April 24.

2108. "Electric motor apparatus." M. Kotyra. Dated April 26.

2115. "Insulators or apparatus for carrying overhead electric telegraph or other wires." J. S. Lewis. Dated April 26.

2117. "Switch apparatus for connecting and disconnecting electrical lines for telegraphic or telephone communication." J. Imray. (Communicated by T. A. Connolly.) Dated April 26.

2118. "Electrical accumulators or secondary batteries." P. Higgs. (Communicated by C. Forbes.) Dated April 26.

2147. "Improvements in and relating to the generation, storage, regulation, distribution, and utilisation of electricity, and apparatus or means therefor, and in methods or means to be employed in the construction of such apparatus or parts thereof." J. S. Williams. Dated April 27.

2148. "Improvements in and relating to the generation, storage, regulation, distribution, measurement, and utilisation of electricity, and apparatus or means therefor, and in methods or means to be employed in the construction or operation of such apparatus or parts thereof." J. S. Williams. Dated April 27.

2152. "Incandescence electric lamps." L. G. B. Arrighi. Dated April 28.

2153. "Electric 'cut outs,' or apparatus for automatically preventing too high an electric current passing in a circuit." F. V. Andersen. Dated April 28.

2156. "Manufacture of electrical and other measuring instruments." W. E. Ayrton and J. Perry. Dated April 28.

2159. "Improved automatic, electric, magnetic, galvanic, and mechanical indicators for recording the direction and speed of the engines, and the height of water in the bilge wells of a steam-ship, or such like vessel." C. Stout and C. H. Hillcoat. Dated April 28.

2185. "Improvements in the manufacture of incandescent lamps, and in apparatus to be used in connection therewith." W. Crookes. Dated April 30.

2189. "Electric telephones." H. J. Allison. (Communicated by J. H. Robertson.) Dated May 1.

2195. "Electric ways or conductors." B. J. B. Mills. (Communicated by E. M'Bentley and W. H. Knight.) Dated May 1.

2198. "Incandescent electric lamps." F. Wright and M. W. W. Mackie. Dated May 1.

2200. "Means of and apparatus indicating the divergence of magnetised needles." G. C. Cooke. Dated May 1.

2205. "Dynamo machines and lamps connected therewith." S. Pitt. (Communicated by L. Daft.) Dated May 1. (*Complete.*)

2210. "Dynamo-electric and electro-dynamic machines and appliances connected therewith for measurement of electric power." Sir W. Siemens. Dated May 1.

2214. "Apparatus to be used in connection with electrical accumulators for regulating the amount of energy thereof." C. A. A. Capito. Dated May 1.

ABSTRACTS OF PUBLISHED SPECIFICATIONS, 1882.

4305. "Telephone receivers or transmitters." C. A. Teske. Dated September 9. 4d. Relates to electro or permanent magnetic telephone receivers or transmitters in which the armature, plate, diaphragm or tympan is dispensed with and a vibrating medium takes its place. (*Provisional only.*)

4317. "Secondary or storage batteries." F. J. Cheesbrough. (Communicated from abroad by A. K. Eaton, of America.) Dated September 11. 6d. The subject of this present invention is a novel and efficient form of secondary, or storage battery. There is employed, in conjunction with an electrode of suitable metal and a solution of sulphate of copper, sulphate of iron, or other metallic salt, an electrode composed of comminuted, or finely divided conducting material. Upon this, as an electrode, the metal from the solution is deposited in such manner that it is readily given back and the battery by this means rendered capable of giving a steady and even current.

4344. "Electric lamp carbons." R. Hammond and L. Goldenberg. Dated September 12. 2d. Relates to a novel construction of carbons or pencils for electric arc lamps, and to the method of manufacture thereof. It is designed to produce a more economical carbon than hitherto, and one which shall possess some amount of flexibility. The carbons are composed of plumbago or other carbon, reduced to a fine powder and intimately mixed with the powder of another substance or other substances, which must be fusible by the heat of the electrical arc. The mixture is packed by any convenient means in a suitable tube, to form the pencil or "carbon," and its partial fusibility bakes the points under the influence of the arc, and prevents the powder falling away. (*Provisional only.*)

4350. "Apparatus for visually indicating electrical signals." B. J. B. Mills. (Communicated from abroad by J. U. Mackenzie, of America.) Dated September 12. 10d. The object of the present invention is to produce an electrical visual indicator, capable of use for all the purposes to which such an instrument may be applied, which will be exceedingly cheap, simple, and compact in construction, absolutely reliable in operation, and possessing such durability that it will not readily get out of order in any of its parts; and which further, by reason of its cheapness, compactness and reliability, will be adapted for many uses to which the visual indicators heretofore produced could not be applied, such as for indicators for telephone exchanges, district telegraph service, hotels, or for other similar uses. A further object of the invention is to produce an electrical indicator of this character, more especially designed for uses of the nature before specifically set forth, which will be capable of being substituted for the ordinary electrical annunciator drop, and will not only indicate the person who calls, as does the ordinary annunciator drop, but will also show who or what is wanted, thus resulting in a great saving of time and increasing largely the convenience and efficiency of the service, whatever it may be, as well as economisingly permitting a reduction of the staff of attendants.

4352. "Manufacture of electrodes." W. Sinnock. Dated September 13. 2d. Relates to the manufacture of electrodes in such a manner that they shall be capable of storing a great amount of electrical energy within very small space. As the quantity of electrical energy which can be accumulated and stored within a given space and weight depends chiefly upon the extent of surface presented by the electrodes according to the invention, the inventor adopts a method of obtaining a very large surface in small space and with small weight as follows:—When the electrodes are of metal he melts the metal and casts it in moulds, and when they are of material not readily fusible, he makes the material into a pulp or paste and forms it in moulds. In both cases the moulds are provided with numerous core wires, which after the material has set can be removed, leaving the moulded plate or piece perforated with numerous holes, which may be in all directions, exposing a large amount of internal as well as external surface.

4355. "Galvanic batteries." O. C. D. Ross. Dated September 13. 6d. The object of the said invention is to provide an improved galvanic battery applicable to all purposes for which a powerful battery is required, such as electric lighting, telegraphy, telephony, electro-plating, and for the transmission of force. The electrodes which are employed are carbon and zinc. Round the carbon plate or rod is usually packed broken coke in order to increase the surface, and the zinc plates are amalgamated in the usual manner with mercury, or are treated in a novel way by electro-plating with nickel or some other metal which must have the properties of being both a good conductor of electricity and electro positive to carbon, by which means the zinc is partially protected from being dissolved. The improved battery differs from other known batteries chiefly in respect of the manner in which the cells are charged. According to the present invention the inventor employs in the zinc cell water acidulated with one per cent. in volume of sulphuric acid or one and a-half per cent. in volume of hydrochloric acid, and in the carbon cell a mixed liquid composed as follows, viz., 1 volume of hyponitric acid, 3 volumes of sulphuric acid or $4\frac{1}{2}$ volumes of hydrochloric acid, and 4 volumes of water.

4362. "Distributing electricity for the production of light and power." L. Gaulard and J. D. Gibbs. Dated September 13. 6d. Relates to the apparatus described in the number of the Electrical Review for April 21st, 1883.

4366. "Joint for electrical lamps." W. R. Wynne. Dated September 14. 4d. This invention is designed to facilitate the occasional application of the electric light, as, for instance, for illuminating shop windows from without in reflecting lamps. It consists in the arrangement of parts so that when the joint is made by attaching to the socket (or complement) the removable part (or supplement) the circuit of the electric current through the burner is completed and upon the removal of the supplement the supply of electricity to other lamps from the same source is not disturbed.

4367. "Electric lighting." W. Morgan-Brown. (A communication from abroad by F. Schmidt, of Prague.) Dated September 14. Relates to improvements in electric lighting, in which the lighting effect of the lamps is attained by means of the voltaic arc; and the object of these improvements consists therein that different combinations of magnets or solenoids, which are agitated by the same source of electric current, get in motion, thereby produce the voltaic arc, keep it invariably independent from the source of the current and constant at a certain resistance, and so form an automatic electro-dynamic arc light regulator for one or more lamps. Figs. 1 and 1^a show the combination of the four conical magnets, A, B, C, and D, which are fastened radially at the ends of the two levers or bars, *a b* and *c d;* the latter swing easily round their fulcrum, *o*, but in such a manner as to keep them insulated from each other. Every one of the magnets is provided with a double layer of wire, an inside one being composed of a small number of convolutions of large wire, *w*, and an outside one consisting of a large number of convolutions of fine wire, *v*; both kinds of wire are covered with an insulating material. The wires of the same size of the four magnets belong to the same branch of the electrical current, viz., the fine wires to one branch and the large wires to the other one. One end of the large wire as well as the fine one of each magnet is connected with the respective lever whereto the magnet is attached; the other four ends of the fine wire are joined together, thus creating a conducting connection. The two ends of the thick wire wound around the magnets, A and B, are connected with the carbon, K, and those of the magnets, C and D, with the carbon, K^1. When the two poles of an electric current are connected with the conductors of the lamp, the current passes through the lever, *a b*, to which, as above mentioned, the two ends of the thick and of the thin coils of the magnets, A and B, are attached. As long as the carbons are not in contact the current goes through the fine wire of the magnets, A and B, and from there through their joint ends to the fine coils of the magnets, C D, and the rail, *c d*, and then returns to the other pole. The direction of the current generates in the magnets, A and B, a negative and in the magnets, C and D, a positive pole, thus causing the mutual attraction of the magnets, A and C and of D and B, whereby the carbons come into contact. By this contact a dividing of the current takes place, the larger part of the current goes (in consequence of the little resistance of the thick coils of A and B, of the carbons, and of the thick coils of C and D) through the large wire, thus causing the fine wire, on account of its high resistance, to become nearly currentless. The change of the thick current's direction in the magnets, A and B, causes also the change of the former polarity; a north pole is produced in the magnets, A and C, and and a south pole in D and B. The former attraction, caused by the fine branch of current, is changed into repulsion and the repulsion into attraction. The magnets, A and C and D and B, repulse each other, the carbons come out of contact, and the voltaic arc is generated. With the increase of the length of the arc its resistance also increases. The power which the large branch of current loses is gained by the fine branch, consequently at a certain length of the arc a certain resistance is inserted into the large branch, which balances the two powers influencing each other. In this moment the resultant of attraction and repulsion is like zero, and the magnets do not move. But by the gradual combustion of the carbons not only the voltaic arc becomes longer but also its resistance increases in the same proportion, and thereby the equilibrium of the powers is disturbed. The attractive component, as the more powerful one, causes the carbons to approach each other and so always reproduces the equilibrium. This regulating takes place uninterruptedly and automatically during the whole lighting period of the lamp. Figs. 2 and 3 show also combinations of four magnets of two different forms; in fig. 2 the carbon-holders are connected by a fulcrum or hinge, o^1. In fig. 4 each magnet is provided with a carbon, thus forming two lights at opposite sides of the lamp.

FIG. 1.

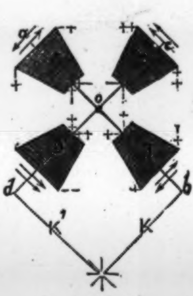


FIG. 2.

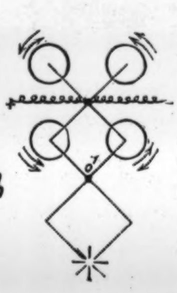


FIG. 3.

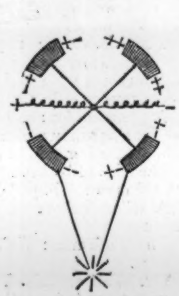


FIG. 4.

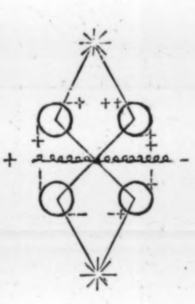
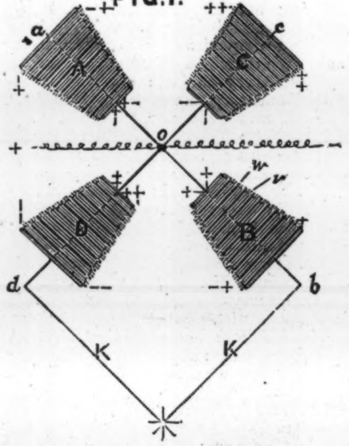


FIG. 1ᴬ.



4376. "Dynamo-electric machines." M. DEPREZ. Dated September 14. 8d. At present, in order to mount the ring of an induction machine on its shaft, a wooden mandril in one piece is forced into the ring with great friction. The lateral friction thus produced on the internal wires of the ring often causes their denudation and renders the mounting difficult, especially when the wires are thin. To obviate this objection the inventor constructs a mandril in several pieces and with variable tightening. This mandril is composed of two main parts; the first part is formed of a number of wooden pieces which externally have the internal form of the ring and externally terminate in two plane surfaces inclined in relation to the axis of the machine. The second part is formed of a bronze collar or sleeve terminated externally by plane surfaces which exactly fit against the internal faces of the wooden pieces so that when the collar is displaced laterally in relation to the axis of the machine, the tightening wooden pieces receive a transverse displacement in relation to the said axis; they are thus compelled to act forcibly against the internal part of the ring. In order that they may not themselves be displaced laterally, a tightening washer is applied against the vertical surfaces. This washer carries screws which screw into the collar and allow it to be drawn at will. Thus the necessary locking can be obtained with them. The invention also relates to points of detail in the construction of dynamo-electric machines.

4390. "Electric lamp-holders." J. W. SWAN and C. SWAN. Dated September 15. 6d. The object of this invention is to facilitate and ensure the making a good electrical connection between the terminal loops of incandescent electric lamps and the conducting wires conveying the electric current. One of the chief features of the improved lamp-holder is the employment of peculiarly-formed hooks (two of which are fitted to each lamp-holder), to engage with the terminal loops of the lamp and make firm contact with them independently of springs extraneous to the hooks, such as have hitherto been used to aid in confirming the contact between the terminal loops of the lamp and the hooks of the lamp-holder. The hooks of the improved holder are so formed as to admit of the passage of the terminal loops of the lamp over the hooks and between two or more contiguous coils of wire; the tendency of the coils to close laterally upon the hooks has the effect of nipping the loops of the lamp between them, that is to say, the wire out of which the hook is made is continued in one or more coils which lie close to the curve of the hook. The hooks of the improved holder are formed of hard and elastic metallic wire, preferably of a hard alloy of silver and copper; but brass, bronze, platinum, or any suitable metal may be used for the purpose. Two of the hooks before described are affixed, side by side, at the same distance apart as the terminal loops of the lamp, to a block of wood, ebonite, steatite, or other suitable non-conducting substance. The conducting wires may be either directly attached to binding screws or their equivalents, in metallic connection with the two hooks; or the piece carrying the hooks may be provided with springs or projections on opposite sides in metallic connection with the hooks, which may be so arranged that when the piece carrying the hooks is pushed into a socket piece to which the conducting wires are connected, the required electrical connection will be made with the wires which convey current to the lamp.

CITY NOTES, REPORTS, MEETINGS, &c.

The Maxim-Weston Electric Company (Limited).

THE adjourned second annual ordinary general meeting was held at the Cannon Street Hotel on Friday of last week, Sir Edward Augustus Inglefield, C.B., F.R.S., the chairman of the company, presiding. There was a large attendance.

The Chairman, at the outset, said there was no occasion to have a notice and therefore no notice would be read convening the adjourned meeting. They left off a fortnight that day, in the board receiving what they considered a vote of moderate confidence in the directors, the accounts not having been passed. They then proceeded to the question of the election of two directors who retired by rotation, but who, being eligible, offered themselves for re-election. These gentlemen were Mr. John Scarlett Campbell and Mr. Hugh Watt, and as they had not sent in any names of gentlemen to take their places they were virtually re-elected and remained directors for another year. That was their advice from a legal point of view, but to show that they as a board had no desire to remain the managers of their affairs unless they possessed the confidence of the shareholders they had passed a resolution deciding as a body to offer their resignations. It was then necessary that the shareholders should elect another board. To do that legally the names of the gentlemen proposed to compose the board must be sent in seven days previous to the holding of the meeting which was to elect them, so it was proposed to dissolve that meeting and to call another in a fortnight to elect a new board. Meantime, the interests of the company would not be neglected as far as the present directors were concerned. The only thing there might be a difficulty about would be the raising and administering of a new capital, but still these could be left in abeyance till next meeting. They should now be able to call a meeting for electing a new board and to raise new capital or otherwise administering the finances of the company. The question of the directors, as he had said, was settled, inasmuch as according to the bye-laws they remained another year members of the board, but not intending to do so they *en masse* gave their resignations to their shareholders, and it would be for them to elect another board. It was necessary to elect a board and also an auditor or auditors in the place of Mr. Dever, of Messrs. Deloitte, Dever, Griffiths & Co., who retired, but being eligible offered himself for re-election.

Mr. Lea proposed the re-election of Mr. Dever as auditor.

Mr. Russell seconded the motion.

A Shareholder thought the auditor's appointment should stand over until the accounts were passed. If the chairman and directors were in any way to blame the auditor was also, he thought (hear, hear).

The Chairman was much obliged to the shareholders for taking a little of the responsibility; but he did not know that Mr. Dever had done differently to what had been done in other companies.

Mr. Dever said he should be unwilling to press the subject of his re-election; but the accounts themselves were not objected to at the last meeting; the objections were entirely in regard to the management of the expenditure, with which of course the auditor had nothing to do (hear, hear). The fullness of the accounts in the balance sheet was without doubt and without question (hear, hear).

The Chairman asked, having heard Mr. Dever's explanation, if they had anything more to say. He agreed with Mr. Dever that he had merely to look through the accounts. The directors were quite willing to bear all the responsibility themselves, and he should be glad indeed if they elected a committee to examine into the accounts, so that the charge of their "frittering" away the funds of the company might be proved or disproved. It was now for him to put the motion to them for the re-election of Mr. Dever as auditor.

Mr. Talkington: Cannot the motion stand over till next meeting? (Hear, hear, and "No, no.")

A Shareholder: I should say it would be most inconvenient, in the interests of every one concerned, that Mr. Dever's appointment should stand over (hear, hear). I do not think we ought to be getting up rows among ourselves (laughter).

The Chairman: We are willing to bear all the responsibility of anything that may be wrong in the accounts.

The motion was then put and carried, there being only three against it; and the salary of the auditor was fixed at the same rate as last year, namely, 30 guineas.

The Chairman: Have you any questions you would like to ask the board? (A pause.) Meantime I may show you for your edification a gold medal which I received at the Crystal Palace since the last meeting of the company. (Exhibits medal.) It is different from most medals, as it is for our whole system of lighting (hear, hear). I went to the Crystal Palace and received it from the Duke of Teck, and also a diploma of honour.

A Shareholder: Perhaps you will say if it was the only medal given.

The Chairman: We are the only company that had a medal for our whole system of lighting (cheers).

Mr. F. Harvey-Samuel: May I ask if all the directors of the Lancashire company have paid up the amount of their shares.

The Chairman: That has nothing to do with this company.

Mr. Harvey-Samuel: It has everything to do with this company in respect that the Lancashire directors are large debtors to this company.

The Chairman; As a matter of fact, the shares have not all been paid, and we are now taking proceedings against one or two shareholders.

Mr. Harvey-Samuel: Directors I said.

The Chairman: They have paid.

Mr. Harvey-Samuel: Would you tell me if Mr. Dadson has paid his shares.

The Chairman: Mr. Dadson is not a director; at least he has not taken his seat.

Mr. Harvey-Samuel: I understand Mr. Dadson had the call of a large number of shares in this company in consideration of his taking up a certain number of shares in the Lancashire company, and if he has not fulfilled his agreement it is not worthy of the directors that they have not taken action to enforce it.

The Chairman: There was a call, but that call has expired. There is a certain amount of money due by the Lancashire company, and we are taking such measures as we can to obtain that money. Very likely it will be obtained, but there is no use thinking you will get calls in at a moment's notice.

Mr. Harvey-Samuel: Did I understand Mr. Dadson had been elected to a seat on the board but had not taken it?

The Chairman: Not on this board; on the Lancashire board.

Mr. Harvey-Samuel: Did——

Mr. John Scarlett Campbell rose to order. He was not a director of the Lancashire board himself, but he did not think it was in the right of that meeting to express whether or not the Lancashire board of directors had acted properly or not.

Mr. Harvey-Samuel: It may not be strictly in order to ask a question about the Lancashire company, but as some of the directors of this company are directors of the Lancashire they might volunteer such information (cheers).

The Chairman said he entered the Lancashire company against his will, thinking he would be benefiting the parent company, and he wished other shareholders had taken up some of the Lancashire company's shares.

Mr. Harvey-Samuel: That does not answer my question.

The Chairman: I think it ought not to be brought before this meeting. You should confine yourself to the immediate object of the present gathering.

Mr. Harvey-Samuel was not able to be present at the last meeting of the company, and he should like to ask whether the present board had it in their power to materially assist that company in the raising of the capital they thought necessary.

The Chairman: Personally?

Mr. Harvey-Samuel: No; by influence or otherwise (laughter).

The Chairman: I think we are hardly in a position to state that (renewed laughter). We shall naturally do our best as large shareholders. You mean whether we have a scheme actually to propose. That will be brought on at the extraordinary general meeting to follow this meeting. This really closes the adjourned ordinary general meeting, and we now call the extraordinary general meeting, which was also adjourned.

Mr. Tallerman here rose, and was received with general interruption.

The Chairman (to Mr. Tallerman): You got plenty of time at the last meeting and assailed us very much on personal grounds. I must therefore beg of you to sit down.

Mr. Tallerman endeavoured to speak, but could not be heard on account of the interruption.

The Chairman: Will you be good enough to sit down (Mr. Tallerman sat down). The last extraordinary meeting was adjourned, because the general meeting was adjourned, and it was decided we could not go into the question of increasing the capital on account of the board not having a vote of confidence. The same reason exists now, and we think it is hardly right that we should propose the raising of capital of which we are not to be the managers (hear, hear). I think you will all agree with me that this is a fair way of putting it, and that this subject of new capital will be better brought before you by a new board, or when you know who the directors will be who will administer the capital you subscribe (hear, hear).

Mr. Watt agreed with the chairman.

The Chairman: If that is your opinion I shall submit:—"That the board, in consequence of the resolution showing a want of confidence in the directors, have resolved to place their resignations in the hands of the shareholders, and that a special meeting be called on the 18th for the purpose of electing a new board." This will give us time for sending out the notices, and there will then probably be a new scheme for raising capital, which will be discussed. Any of you who wish to propose new directors legally must do so at least seven days before the meeting is held, at which their election or non-election will be decided.

A Shareholder: Who are the gentlemen who are to propose this new scheme at the next meeting?

The Chairman: If you have got one, we shall be happy to have a scheme from you. (After a pause.) If you have nothing else to put forward with regard to the company this meeting is dissolved, and a new meeting will be called in the ordinary way.

A Shareholder: Will circulars be sent out.

The Chairman: Circulars will be sent out because the next will be a new meeting. Meantime, I may say we are not without hope that a scheme will be brought before you which will place the company in a very favourable position.

A Shareholder: This meeting being dissolved, how about the accounts?

The Chairman: Unless you choose to pass the accounts, we cannot help it.

Mr. Watt explained that he was quite prepared, if they wished it, to give them information in regard to the accounts (hear, hear, and a shareholder: "At next meeting"). Mr. Watt here read a statement showing that the net expenditure in the year under review had been £9,000, or about 60 per cent. less than in the previous year, including £4,000 which ought to have been charged against the previous year in respect of accounts which had not been sent in by the 31st March, 1881, and consequently could not be included in this year, and that a large proportion of the £9,000 had been expended on plant.

Mr. Harvey-Samuel asked how the £956 for law expenses had been incurred.

Mr. Watt: That is in connection with the Parliamentary Electric Lighting Bill, promoted by this and other companies. The amount of expenses falling due by this company is the sum named.

The Chairman: When applications were made to get a separate lighting act for each company, it was agreed, instead of each company acting independently and getting a separate act, that the different companies should combine in one application, and obtain one act. We thereby reduced our expenses.

Mr. Harvey-Samuel: Are you not rather referring to the item "Parliamentary expenses"? I do not mean that; I mean in the expenditure for the year, "Legal expenses, £976 1s. 11d."

Mr. Watt: These are ordinary legal expenses for the year. A large amount of that sum was incurred in connection with patents and concessions.

Mr. Harvey-Samuel: It seems a large item.

The Solicitor: I have not the account before me, and cannot give an explanation. It is partly made up in the expenses in the purchase of the Maxim-Weston patents and in the sale of your patents.

Mr. Harvey-Samuel: That would be in the year before.

Mr. Watt: No.

Mr. Harvey-Samuel: Has not some of these expenses been incurred in the promotion of the Lancashire Company.

The Solicitor: No, certainly not; I have nothing to do with it.

The Chairman: I can assure you we have done everything to cut down the legal expenses, and have never incurred any except when necessary.

Mr. Harvey-Samuel: I really have received no answer to my question.

The Chairman: Will you ask it again; we have nothing to conceal.

Mr. Harvey-Samuel: I simply ask can you tell me in what way this £976 in legal expenses has been incurred. It has not been in parliamentary expenses, or in expenses in connection with the Lancashire Company.

The Chairman: I shall give you an instance in the case of Mr. Tallerman, who, I see, is sitting beside you and prompting you. When he came for a concession——

Mr. Tallerman: Yes, but you are afraid to hear Mr. Tallerman.

The Chairman: Not at all.

Mr. Tallerman: I say you ought to have been ashamed (interruption).

The Chairman (to Mr. Tallerman): Sit down.

Mr. Tallerman again attempted to speak, but was generally interrupted.

The Chairman: Will you be kind enough to sit down?

Mr. Tallerman: Don't you allude to me again then.

Mr. Harvey-Samuel: Was £500 expended in connection with the concession you granted to the company with which Mr. Tallerman was connected?

The Chairman: No, I think not.

Mr. Harvey-Samuel: May I take it that £50 was expended?

The Chairman: I do not know.

Mr. Harvey-Samuel: When this question is put it is hardly fair for you to make a sneering allusion to Mr. Tallerman (interruption).

Mr. Watt: The legal expenses from November 10th amounted to about £100. I do not know anything of the expenses previously to then.

The Chairman: The legal expenses seem to be for the whole two years.

Mr. Harvey-Samuel: It says for the year.

The Chairman: Every information you desire to have will be given you. We have nothing on earth to conceal, and I shall afford the same information to one and all of the shareholders of the company.

Mr. Allender: As a member of the late committee I think I ought to say I feel, provided the necessary changes are made in the management of the company, that the shareholders ought—it will be in their interests—to subscribe new capital; but unless certain changes are made I shall not myself subscribe anything, and shall do everything I possibly can to prevent gentlemen throwing their money away.

A Shareholder: What changes do you propose?

Mr. Allender: I shall propose them at the next meeting.

Mr. Watt: I think after the remarks made I have something to say. A letter was received by the solicitors of this company to the following effect. Mr. Wilde was asked to see the solicitors of certain parties who made certain——

The Chairman: That is a private letter.

Mr. Watt: The purport of the letter is this——

The Chairman: Anything personal of this sort is not for the advantage of the company.

Mr. Harvey-Samuel: We do not want personalities; we want business.

The Chairman: We cannot do more to-day than we have done. We resign our seats and we leave you to fill our places with "better" men. We agree to hold our places till another board is elected and we shall be glad to give the new directors any information we can. I think the business of the meeting is concluded. The legal expenses cover, apparently, the two years.

Mr. Landon (the late secretary of the company): These expenses are from the 30th June 1881 to the 31st December 1882.

The Chairman: We all feel time is an object; Mr. Inverarity, I fancy, has some scheme which there would be no harm in his submitting because his doing so would give the shareholders an opportunity of digesting it before meeting again (hear hear).

It being the opinion of the meeting that Mr. Inverarity's scheme should then be submitted,

Mr. Inverarity, a former director, stated that his scheme was that the capital of the company be increased nominally to £500,000 by the creation of 327,500 shares of £1 each, beyond the registered capital of £172,500 in 172,500 shares of £1 each, and that the directors be authorised to issue at once 50,000 of these new shares to existing shareholders at 6s. 8d. the £1 share, half payable on allotment and half in not less than three months subsequently. The prices of the shares that day was not 6s. 8d. each, and in consequence of the shareholders taking them up at that rate it was right they should have some compensation, and as compensation he proposed that those who took the new shares at that price should have the option at any time within eighteen months of taking up, at the same price for every one share now subscribed for, two other new shares. No general allotment on the foregoing terms should, however, take place unless three-fourths of the whole of the 50,000 were subscribed for. The adoption of such a scheme would place the company in the most flourishing condition.

The Chairman: It is very good for you to have that scheme to consider; but let me re-assure you before giving up my duties of chairman of the company, that I believe it is the opinion, not only in the public mind but in the minds of most of the large electric lighting companies, that we possess the best patents extant, and that from the continued applications to us for concessions, for electric lighting plant, and for installations, I am satisfied that opinion is growing rapidly in the public mind. (Hear, hear.) It is my duty to tell you that, because I believe it would be a thousand pities if you did not support the company to the utmost extent. (Cheers.)

On the suggestion of Mr. Inverarity the following resolutions, which, it was explained, could be confirmed or otherwise at the next general meeting, to be held on the 18th inst., were formally agreed to:—

"That the nominal capital of the company be increased by the addition thereto of 327,500 shares of £1 each, beyond the registered capital of £172,500 in 172,500 shares of £1 each, making the total capital £500,000;" and "That such 327,500 shares may be allotted at the discretion of the directors, on such terms and at such times as they think fit, and either at a premium or a discount."

A vote of thanks to the chairman concluded the meeting.

The Brazilian Submarine Telegraph Company (Limited).

THE nineteenth half-yearly general meeting was held at the Cannon Street Hotel, on Friday of last week—Sir James Anderson, the vice-chairman of the company, presiding.

The Secretary (Mr. R. Collett) read the notice convening the meeting, and the directors' report, which we published in our issue of the 28th ult., was taken as read.

The Chairman said he was sure they would join with him, and the directors generally, in regretting the absence of their noble chairman (Viscount Monck) through indisposition. At the same time, as far as the meeting went, there was no necessity for his attendance, for happily they might almost have had no meeting for anything there was to tell them. Everything was going on very well. In looking over the accounts, he found very few items worth calling their attention to—in fact, they were of no special moment—but he would just name them. The increase in the receipts of the half-year over the corresponding half of the previous year was £1,700, the increase of the expenses in London £230, and the decrease of the expenses at stations £23. The increased expenses in London were owing to their having to put their office in order, renew the furniture after eight years' wear and tear, and travelling expenses. Their reserve fund amounted to £363,000. Though that was a very meagre statement, and he had nothing more to say with reference to the half-year's report, yet some of them, he dared say, would know that they were face to face now with a certain amount of opposition from a new line laid down on the west coast of America belonging to American companies, but he was glad to say they were not yet suffering from that opposition, although these American companies were taking traffic at a lower rate. They should have to face that reduction before long. His own expectation was that the increase in traffic would recoup them in a short time. They had, in fact, a very high tariff—the highest, he believed, of any company in the world—and they had a long monopoly, about ten years, during which they had developed their trade gradually, and they found it was a growing trade, capable of much more development. They had got a good reserve fund, and they had duplicated one of their sections. Some objection had been made by one shareholder to their carrying the interest of the reserve fund to the reserve fund. They had referred that matter to their solicitor, and were advised that it was quite within their power and right, and, in fact, that they ought to do it. It had been customary for all cable companies to carry the interest of the reserve money to the reserve fund. They knew that the policy of that board, and of the other cable boards with which they were associated, had been to build up their reserve; above all things to keep their property intact; to have at their bankers that which would keep it intact. That policy had been very strongly pursued by that board, and had been uniformly supported by the shareholders. A few years ago, as they knew, they, with the sanction of the shareholders, added £50,000 to the reserve fund. He did not think any one who valued the property, and knew anything about the risks to submarine property laid in very deep water, would object to their keeping up the reserve fund so long as they paid a fair dividend. First and second interim dividends, amounting to £39,000, had been paid, and £25,000 transferred to the reserve fund, leaving the sum of £9,421 0s. 2d. to be carried to the next account. He moved the adoption of the report and accounts.

Mr. F. Youle seconded.

Mr. Law asked if to duplicate one of their cables it was necessary to take money from the reserve fund, and to sell any of their investments?

The Chairman replied that the cost was taken from the reserve fund, and that the reserve fund was credited with the cost. None of their securities were sold to duplicate the cable. He hoped they would yet duplicate the whole of their system.

The report and accounts were unanimously adopted.

On the motion of Mr. Law, seconded by Mr. Craney, the thanks of the meeting were awarded the directors for their able management of the affairs of the company.

The meeting then separated.

The Telephone Company of Ireland (Limited).

THE first half-yearly ordinary general meeting of the proprietors of this company will be held at the offices of the company, Dame St., Dublin, on the 18th inst.

The directors' report, which will then be submitted for the first six months of the company's operations, since the transfer of the business from the United Telephone Company, ending the 31st January last, states that the company's business, during the six months has been satisfactory. The number of subscribers to the exchange system of the Dublin district, and the number of renters of private lines, as they stood on the last day of each month during the past half-year, are respectively as follows:—1882, 31st July, 206, 80; 31st August, 212, 83; 30th September, 229, 86; 31st October, 244, 91; 30th November, 265, 95; 31st December, 275, 95; 31st January, 1883, 301, 105. Although the business was formally transferred by the United Telephone Company only as from the 31st July, 1882, it was practically under the control of the concessionaire for some months previously, and it may be interesting, therefore, to the proprietors to state that the number of exchange subscribers on 31st January, 1882, was 87, and that this number has been increased during the twelve months ending 31st January 1883, to 301; whilst the renters of private lines have also increased in number during the same period from 64 to 105. The accounts with the United Telephone Company for expenditure on fixed plant, &c., were still open at date of preparation of balance-sheet, and the amount, £5,897 14s. 8d., appearing in balance sheet, is therefore subject to alteration on final adjustment of the accounts. Having regard to the fact that the sum of £1,575 14s. 7d. for rentals received up to 31st July, 1882, by the United Telephone Company, has been deducted from the expenditure incurred to that date for fixed plant, &c., it is proposed to ask the sanction of the shareholders to the transfer of the amount standing to debit of preliminary expenses account to the expenditure on capital account, in accordance with the provisions of clause 87 of the articles of association. The capital expenditure will then fairly represent the actual outlay on fixed plant, and in establishing the business; and the preliminary expenses account will be closed. A resolution to this effect will be proposed at the meeting. The balance standing to credit of profit and loss account admits of payment to the preference shareholders of the full dividend, at the rate of 6 per cent. per annum upon the amounts paid upon the preference shares, from the dates of the respective payments thereon, and the directors propose to allocate the remainder as follows, namely:—one hundred guineas as fees to the directors for their services from the date of the formation of the company to the 31st January, 1883, and to carry forward the balance to the credit of the profit and loss account for the current half-year.

Great Northern Telegraph Company of Copenhagen.

THE annual general meeting of this company was held at Copenhagen, on the 28th ult., Mr. F. Zahle presiding.

The Chairman, Mr. C. F. Tietgen, in reporting upon the condition of the company's cables, observed, that with regard to those in Europe the past year had been the most favourable that the company had experienced. One of the short cables between Finland and the Aland Islands had been interrupted in the month of January, but fortunately the Gulf of Bothnia, which is generally closed at that time of the year, was free from ice, and the company had therefore been able to effect the repairs within eleven days. With this exception no interruption had occurred. It had been different with regard to the cables in the far East, where the interruptions from the usual causes, say, anchors and fishing, had been numerous. The cable between Wladiwostock and Nagasaki had been interrupted once for twenty-three days, the Nagasaki-Shanghai cable six times, for thirty days in all; and the cable between Shanghai and Hong-Kong eight times for sixty-two days. These interruptions might almost be called epidemic, as they nearly all occurred in the early part of the year, whilst during the last six months of the year there had not been a single repair to effect. Notwithstanding these interruptions there had been an increase in the traffic receipts, mainly owing to the successful working of the European cables. The best, the safest mode of ensuring regularity in the service of telegraph routes was undoubtedly duplication. This not only increased speed under ordinary circumstances, but prevented cessation of work during a breakage. The excellent results of this duplication, and he might with regard to some routes say triplications as introduced in the company's European system, had for some time past had the full attention of the board as regarding the company's lines in the far East, for which it had hitherto been impossible to provide such a reserve. The company had, however, during the past year succeeded in obtaining the desired conditions for carrying out such duplication in the far East. It being in the interest of the Japanese Government, and also in that of the Russian Government on account of their land line system, that this duplication should be carried out, the company had been enabled to make satisfactory arrangements with both Governments. The Japanese Government had given the company the exclusive right to connect Japan by telegraph cables with the Continent of Asia and the adjacent islands for the next twenty years, which term may subsequently be extended. The Russian Government, following the example of Sweden and Norway, had likewise extended all the concessions of the company for their connections with the Russian coasts up to the year 1912. These preliminaries having all been arranged, the company had made a contract with the Telegraph Construction and Maintenance Company, in London, for the making and laying of the cables from Wladiwostock to Nagasaki, and from Nagasaki to Shanghai. The manufacture of the same had now been nearly completed, and the cables were expected to be laid and in working order in August and September this year. With reference to the cable between Shanghai and Hong-Kong, the duplication of which was of as great importance to the company as that of the other sections, the company had, always with a view to the consent of the Chinese Government, made arrangements with the Eastern Extension Telegraph Company to the effect that the latter should undertake that part of the duplication. That arrangement was based upon the terms of previous agreements existing between the two companies, and the terms were such that this company would derive the same benefit as if they had themselves undertaken the duplication. In order to meet the expense of the new lines of the company, the directors being duly authorised, had on the 1st of March issued £300,000 five per cent. obligations, redeemable in not exceeding thirty years. The obligations had been offered to the shareholders and the general public by the Private Bank of Copenhagen, and by Messrs. C. J. Hambro & Son, of London, where nearly the whole amount had been placed. It was a satisfactory proof of the growing confidence of the shareholders in the company's undertakings that the raising of so considerable a loan had in no wise affected the price of the shares, nor was there any reason why that should have been so, as the interest and redemption would only absorb £20,000 per annum, an amount which might fairly be expected to be earned by an increase of traffic consequent upon the duplication. But even if this expectation should not be realised, which was hardly probable, the amount would easily be covered out of the large sums which had hitherto every year been set aside for the reserve fund, which fund would in future, after the establishment of the duplication, not require such large augmentations. After referring to the different items of the balance sheet, the chairman closed his remarks by assuring the shareholders of the directors' continued confidence in the future of the company, a confidence they had shown by proposing an increase in the dividend, which would thus be 8 per cent. for the past year.

Without discussion, the report was then unanimously adopted, the accounts were passed, and discharge given to the board of directors.

The retiring director, Mr. C. A. Broberg, was re-elected.

The shareholders' auditors, Admiral Bille and Mr. A. Berner were also re-elected.

A final dividend of 6s. per share for 1882 is now payable at the company's bankers, Messrs. C. J. Hambro & Son, 70, Old Broad Street, London, E.C.

The Hammond Electric Light and Power Supply Company (Limited).

THE second ordinary general meeting was held at the Cannon Street Hotel on Wednesday, Sir Charles Lawrence Young, Bart., the chairman of the company, presiding.

The Secretary (Mr. P. A. Latham) read the notice convening the meeting.

The report of the directors from the commencement of operations in February, 1882, to December 30 in the same year, was taken as read. It stated that after writing off a depreciation of 12½ per cent. on the plant in use in the company's business, making sundry other necessary allowances, and placing the £52,162 in shares in sub-companies to a special investment account, the amount at the disposal of the directors in cash was £13,085 19s. 8d. Of this they advised the following distribution:—£3,997 10s. in payment of a dividend of 5 per cent. upon the ordinary shares, £5,000 to be written off the goodwill and concessions account, £3,000 to be placed to reserve fund, and £1,088 9s. 8d. to be carried forward to next account. The amount for distribution would have been larger if the company, acting under the advice of counsel, had not determined to return to the purchasers of the concessions for Yorkshire, Staffordshire, Warwickshire, and Worcester, a considerable portion of the consideration paid for these concessions on account of the Lane-Fox difficulty. For the loss sustained over the Lane-Fox difficulty the company were suing the Anglo-American Brush Electric Light Corporation. In addition to the claim for damages under that head, the directors were further suing the same corporation for breach of contract in the supply of machines, and for absolute failure to supply a Brush dynamo machine suitable for incandescent lighting, as covenanted for by the Anglo-American Corporation in its licences, and for other matters which would be made public at the proper time and in the proper place. The confessed inability of the Brush Corporation to supply dynamo machines suitable for incandescent lighting, for which there was a great and growing demand, had given their directors very grave anxiety during the past year, and they were glad to be able now to inform the shareholders that they had secured, without any money payment whatever, the sole agency within the United Kingdom for the new Ferranti dynamo machine. That machine was giving excellent results, and the Ferranti Company had just completed the fitting up of a substantial factory, so that they might be able to turn out dynamo machines of various powers in sufficient number to meet the business requirements of the company. The directors had further acquired on behalf of the company, and on reasonable terms, the "Wright and Mackie" manufacturing patents, by which the production of incandescent lamps was much cheapened, and suitable works on an economical basis had been fitted up to cope with this branch of the business. The Hammond Company Electrical Engineering College was founded last summer for the purpose of training young men in the profession, and of securing to the company in the future the benefit of thoroughly skilled assistants; and, though thus started only a few months ago, it had met with a considerable measure of success, and had shown a good margin of profit. As regarded the general business prospects of the company, the directors could only say that they had unceasingly pushed the means at their command, and that the name of the company was well known throughout the large towns in all parts of the country, and that confidence in the ability of the company was rapidly extending. The directors were confident that when the provisional orders which had been so extensively applied for were granted in the autumn by the Board of Trade, the Hammond Company would probably be entrusted with a good share of the extensive electrical engineering work which, through the action of Parliament had been delayed, but which would be then at once set on foot in many of the largest towns in the country.

The Chairman said, considering the business in which they were engaged was an absolutely new one, and considering the number of difficulties they had had to contend with in the last twelve months, difficulties which were inseparable from the starting of a new undertaking, he trusted they would regard the report as not unsatisfactory. He did not propose to go particularly into the report and accounts, as Mr. Hammond would say a few words in regard to them, but still there was one important matter referred to in the report to which he wished to draw their attention, and that was their losses or their failures of profit in the matter of the Lane-Fox licence. When the prospectus of the company was originally issued, care was taken that the investor should understand that the company had to offer precisely what Mr. Hammond had acquired from the Brush company, and the language of the prospectus was rigidly limited to the language of the Hammond concessions; but at the same time the board of directors was under the impression that the company possessed the exclusive use of the Lane-Fox patents for incandescent lamps. Consequently, when at the commencement of the business of the company there did not appear to them to be anything inaccurate in their using the words that they were "sole concessionaires" for the Brush and Lane-Fox patents. Unfortunately, they were subsequently landed in an awkward position. Certain parties had come to them and offered to purchase their concessions for certain counties and districts. They accepted these offers, and received the consideration money. The transfer licences were made out —copied from the licence they held from the Brush Company— and were submitted to and approved by the solicitors to that company. The sub-companies, in due time, came out with their prospectuses, with which the Hammond Company had nothing to do, and these prospectuses intimated that the sub-companies possessed the sole and exclusive rights of the Lane-Fox patents, and on the faith of these prospectuses the companies got their capitals. Then came the collapse of the great speculation in electric lighting shares, and people began to think how they could get out of the companies. A letter by an eminent electrician in the public press at that time stated that the Lane-Fox patent was not held exclusively by the Brush Company, for the British Electric Light Company had the right to the same patent under another name. Thereupon the purchasers of concessions turned upon them and said, "You have sold us that which you did not possess;" pointed out that two of the Brush directors were directors of the Hammond board, and said they intended to bring an action against the Hammond Company, not only for the cash paid for the concessions but for damages. The Hammond directors took the advice of eminent counsel in the matter, and were advised that while they had a strong defence to the threatened actions the far more prudent course in the interests of their shareholders would be not to enter into litigation with these companies. That the case had not been amicably settled, as he firmly believed it might have been, was no fault of their directors. As an appeal to a legal tribunal had been made by these companies, to a legal tribunal they must go, and there the full particulars and all the details would be made public, and a decision be ultimately arrived at. The Anglo-American Brush Corporation were suing them for a balance alleged to be owing on a large order, which balance had, on legal advice, been withheld in the belief that they had an ample set-off to the claim, their claim against the Brush

Company being far the heavier. When he had the honour of addressing them at the statutory meeting of the company a year ago, they were in the midst of a popular electric lighting craze, which, however had now very considerably diminished. In electric lighting they had great obstacles to contend with. He did not allude so much to individual prejudices as to that which it was always most difficult to contend with—the man in possession. Now the gas-man was in possession. He had a tremendous monopoly, was backed up by Acts of Parliament, &c., and would not yield an inch; and if electric lighting had done no more, it had conferred a great boon on the public in compelling the gas companies to light the streets better than heretofore; but to spend a great deal of money in teaching other people their duty was not usually a commercial success. An electric lighting company, however, was scarcely likely to be content with such a result, and they had to go on energetically with what they had in hand until they attained that measure of success to which they were entitled. It was for them to show that they could serve the public better than gas companies, and with, he hoped, a less amount of long-suffering than had hitherto not unfrequently been the lot of the patient consumer. He should like to know what gas company could show a profit from its street lamps if it had not the privilege of domestic lighting at the same time, and he thought Mr. Hammond was prepared to show them that with a new Feranti machine, capable of running 5,000 lights, they could serve a district better than any gas company at a cheaper rate and with a handsome profit. They had been incessantly at work advertising their wares all over the kingdom, and had met with considerable success, and of one thing they might be certain and that was that the firms who had adopted the electric light were not likely to abandon it. It had proved the greatest benefit to those employing it. He now wished to say a few words in regard to the position of their managing director. It would be in the recollection of most of them that in the inception of this company it was understood that Mr. Hammond would undertake the position of managing director without any salary, but it was not contemplated at the time that he should give them his exclusive services and should undertake no other engagements. As a matter of fact, he had had to give up his whole time and energy to the affairs of the company. He had held firmly and honourably to that company, and it was not agreeable to the board that they should be in such a manner dependent on his goodwill, for the situation was obviously unfair both to Mr. Hammond and the company. They proposed to make an alteration in his agreement with the company so as to retain his exclusive services, and to effect that they considered it desirable to appropriate a sum of money for his adequate remuneration in the future. Mr. Hammond had expressed his willingness to devote his services exclusively to the interests of the company at the annual remuneration of £1,000, and now they proposed to present him with the sum of £500 and with the electric plant which had been erected in his private house (hear, hear). He concluded by moving that the report and accounts be adopted, and that a dividend be paid at the rate of 5 per cent. on the ordinary shares.

Mr. Hammond seconded the motion and said he had, as they knew, during the last few weeks been addressing large audiences from one end of the country to the other on the subject of electric lighting, and having come fresh from Manchester, where he was allowed to hold forth for two hours, he was under temptation now to once more go into the subject. He, however, refrained because he felt he was addressing an audience perfectly at one with him with regard to the ultimate future of the light. In his address the chairman had not particularly touched upon the stand of this company in the electric lighting of the future, and therefore before he dealt with the accounts he would make a few remarks on that point. Let them go back a year ago. What was the position of the electric light industry then? They had just seen the close of the Crystal Palace Exhibition. It had been proved there that the electric light would become an immense factor in the lighting of the future. Men in England, as it were, awoke suddenly to the fact that it was possible to have the electric light under perfect control, and in such a form that it could be used in every household. Those who did not limit their view, as some companies did, to the two or three months that lay before them, felt convinced that they were entering on as new and great an epoch as that at the introduction of the railway. The Hammond Company, he contended, above all companies felt impressed by that fact, and immediately laid itself out, not to extract as it were the golden ore in one year, and then come suddenly down and it might be grabble in the street, if he might use the expression, but to be acknowledged as a company sufficiently strong to have its fair share of the work. The Hammond Company, they said, must organise to an extent which the other companies appeared incapable of. During the past year the company had had before it the one object to prepare itself for the immense work coming on. It had striven to make its name well known in every part of England, and not only to make its name well known, but to make it respected and connected with work which would not shame an electric light company; and in every part of England the Hammond Company was now able to point to installations superior in quality and more numerous in number than the installations of any other electric light company. (A Shareholder: No.) Not only had the Hammond Company endeavoured, by putting up installations in various parts of England, to make its name well known, but in its endeavour to organise it had got round it a set of men who could be perfectly trusted to undertake the most important work that could be put before them. When the provisional orders were granted and the question arose as to who should do the work, the Hammond Company would have the best chance, and get the bulk of that work before the other companies. At Leeds lately he addressed 1,300 ratepayers with the mayor in the chair, and when he mentioned that he felt some diffidence in addressing a Leeds audience, with £979,000 invested in gas, upon the subject of the electric light he was greeted with a loud "No" from every part of the hall, and the chairman hastened to explain that Leeds was now convinced of the advantages of the electric light over that of gas, and that it was the light they intended to have; and they showed him that, though they had a million invested in gas that that would not deter them from putting down electric light plant on a large scale in a very short time. Such views were held in every part of England. Corporations were prepared to put money into electric light plant, and put it down on a large scale, as soon as the requisite confidence could be put into them on the subject. There had been so many false shots with regard to the electric light that one could understand the corporations not having the confidence they had in it. He had, therefore, been devoting himself entirely to encouraging confidence in the electric light. The Hammond Company had to his mind amply fulfilled its task, which was to make its way for what was to come, and it was ready. There was no company so ready, no company so able to give accurate information with regard to the cost of electric lighting plant, or to deal with the work, as the Hammond Company. They started as the child of the Brush Company, and a great deal of the success of the Brush Company had no doubt been due to the Hammond Company. There were those who said if it had not been for the success of the Hammond Company's installations the Brush Company would never have been in the position it was a year ago. Whether that were so or not, the fact was that they did start as the offspring of the Brush Company. They had a certain number of counties allotted to them in the north of England, where they organised and worked under the banner of the Brush Company. With such weighty interests before them they of course expected that the Brush Company, whose interest was identical with theirs—which lived through its sub-companies—would treat them as the first of its sub-companies and encourage and help them in every way. He was compelled to say, however, that the Brush Company a year ago started upon a course which absolutely meant ruin to electric lighting from their point of view, and it was soon evident that it was utterly impossible for them to continue under the banner of the Brush Company. Instead of sending out perfect material the Brush Company sent out the most careless material that a manufacturer of England ever dared to pass his door. They saw what was coming, and disorganisation complete was soon in the Brush Company, and of course resulted in discomfiture to the Hammond Company. No company in any part of the world ever had such a future as the Brush Company had, and they being linked to it felt themselves linked to a company which cared nothing for the future at all. The Brush Company did what to the interests of their company was almost fatal—a most suicidal policy—in declaring a dividend of 100 per cent. That declaration absolutely stopped business, and no one knew better than he how much business was stopped. Again, they told the Brush Company that the Hammond Company must have a big incandescent machine; and the answer of the chairman was that he did not think incandescent lighting had reached that stage where a big machine was wanted. The Brush Company, in fact, had no atom of sympathy with them in any way. The speaker went on to refer to the circumstances in which the company became interested in the Ferranti machine, and ventured to say, when the Ferranti 5,000-light machine ran and produced 5,000 lights, it would create an immense sensation throughout the whole electrical world. That machine was a simple piece of engineering; it was so much copper and so much iron, and could scarcely get out of order at all. Electric lighting up to the present time, as they knew, had been produced in a wretchedly small retail manner, and what they wanted to do was to produce it on something like the scale gas was produced on, and in that case he was perfectly confident they would be able to get the same light out of the electric light as out of gas at 2s. 6d. per 1,000 cubic feet could it be measured as was gas. The incandescent light they had obtained by securing Wright and Mackie's patents was at present lighting his house, and they were now prepared to supply those lights in large quantities. As regarded the Lane-Fox patents, they might be sure it was with dismay they found the position in which they were placed. They felt the matter had got to that stage when they could not speak their minds about in public. He must impress upon them, however, their horror, they having two Brush Company's directors on their board to keep them right, at their silence at the critical moment of the selling of these patents. They had had legal difficulties in another respect. At a particular time they purchased from the Brush Company a large quantity of machines. Those machines were given to them under an absolute guarantee of efficiency, newness, and English make. After the money had been handed over to the Brush Company they opened the machines and began to sell them throughout the country, when they found the American and French marks upon them, the English plate only covering the American and French plates. Some of these machines were made in Paris and figured at the Paris Exhibition. These second-hand machines were bundled off to the Hammond Company by the Brush Company and the Hammond Company's money obtained for them. After referring to several items in the accounts, Mr. Hammond said he was perfectly confident of the commercial aspect of electric lighting; he was perfectly confident that if manufactured on a large scale it would become the light of the very near future—in the course of two or three years. Let them put up with the seed time and they would reap a rich harvest.

Mr. Reynolds, who was connected with the Eastbourne and Hastings companies, said no doubt the shares of these companies would ultimately become very valuable; but for these companies and other of their sub-companies it would be found an absolute necessity to raise more capital. The two companies he had named had done remarkably well. The Eastbourne Company had raised £5,000 in local circles, but since last spring electric lighting investments occupied a very different position, the consequence of which was that it was now difficult to obtain any subscriptions for shares in these sub-companies. The Eastbourne people looked to their friends in London to render them assistance; they expected the Brush Company and also the Hammond Company to render them assistance. He had received a letter that morning from the secretary to the Eastbourne

Company, in which he said they had received no response to their endeavours to raise £5,000 further capital. In regard to their difficulties with the Brush Company, he asked if it was not possible that some resolution could be passed at that meeting appointing a certain number of gentlemen to wait on the company, to see if something could not be done to settle their disputes.

Mr. Wood said he had been a large holder of the Brush Company's shares, and was a considerable holder of the Hammond Company's shares, and he might say that he welcomed the hint of the previous speaker. He thought it would be in the interests of both companies that their disputes should be settled without litigation.

Mr. Braithwaite supported the suggestion.

The Chairman thought he might say on behalf of himself and his colleagues that the directors should be only too glad to welcome assistance from the shareholders in the settling of their difficulties. They had done all in their power to bring about a mutual understanding, but all the answer they received from the Brush Company was, "Oh, you pay us up that money, and we shall talk to you about it."

The report and accounts of the directors were unanimously passed.

Messrs. Theobald Bros. and Miall were re-elected the auditors for the ensuing year at a remuneration of one hundred guineas.

It was then agreed that it was very desirable that a committee of the shareholders, to be subsequently appointed, should act with the board in endeavouring to secure a settlement of their disputes with the Brush Company.

A vote of thanks to the chairman closed the meeting.

The Electric Light Contract and Maintenance Company (Limited).

A GENERAL meeting was held at the Cannon Street Hotel on Wednesday for the purpose of winding-up the company. Mr. Martin R. Smith (the chairman) presided, and expressed his regret at the object of the meeting. It was, however, the most judicious course for them to take, as the fact was they had done no business. They had, in fact, done no business, though numerous proposals had been made to them, all of which, however, had presented considerable risk and small profit. After referring to the circumstances of the time when the company was established, he observed that a Bill had been brought into Parliament hampering the electric light most seriously, imposing the most vexatious restrictions and regulations. One was that if the light were a success the authorities could take it over at the expiration of 14 years, which was afterwards, he believed, extended to 20 years; but if it were not a success the company undertaking it had to bear the loss. Had such legislation been determined on as regarded gas, he believed we should still be using oil. The Bill passed last year had, he contended, done more than anything else to prevent the electric light from competing with gas. The result of all the electric light companies starting was excessive competition. The universal offer was the electric light at the price of gas, but he maintained that that could not be done; at least no system, at any rate, of incandescent lighting with which they were acquainted at the present moment could show that it made a profit commensurate with the risk run. He could quite conceive that a well-managed company, manufacturing its own plant and not overburdened with money expended on the purchase of patents, might pay its way and keep going, but more than that he would not allow. Of course they would understand that these remarks applied only to the present position in connexion with the electric light. He could understand that the electric light could be produced at a very considerable profit at New York and on the Continent, where gas was two or three times as dear as it was in this country. They must also remember that the moment the gas companies felt themselves seriously pressed by the electric light companies a large reduction in the price of gas, and great improvements in it would inevitably be seen. The directors still believed in the principles upon which the company was founded, and also in the future of electric lighting, but the company had come into the world a little too soon. They had that morning received a proposal which, he believed, would give a very fair return on their capital, but the only way by which it could be fully considered would be for some gentleman to propose the adjournment of the meeting for a month. He concluded by moving the adoption of the statement of receipts and disbursements, adding, in reply to a shareholder, that he could not go into the terms of the proposal to which he had referred. The resolution was seconded and carried, and on the motion of the chairman, seconded by Mr. Tagart, a sum of 500 guineas was afterwards voted to Messrs. Lee and Young, managers. At an extraordinary meeting which was held subsequently a resolution was passed for the voluntary winding-up of the company.

Perry v. The International Ocean Telegraph Company.

IN the Appeal Court of the High Court of Justice, on Monday, Lords Justices Baggallay, Lindley, and Fry delivered judgment in this case, without calling upon the respondents. The suit was instituted in 1874, and the hearing before Vice-Chancellor Bacon occupied nearly a fortnight in June, 1881. The bill was filed by Mr. Horatio Justus Perry, an American citizen, against the International Ocean Telegraph Company (an incorporated American company of the State of New York), the West India and Panama Telegraph Company (Limited), and the India-rubber, Gutta-percha, and Telegraph Works Company (Limited), the case made being shortly as follows:—In 1866 the plaintiff entered into agreements with the International Company and the defendant Charles Knap, under which he was to endeavour to obtain a concession from the Spanish Government for establishing a system of telegraphic communication between Spain and the Spanish West India Islands, Cuba and Porto Rico. On obtaining such concession he was to assign a portion of the privileges conferred by it to the company, and the remainder to Mr. Knap, receiving in consideration a fixed sum from the company, and from Mr. Knap a moiety of the profits which he should derive from the sale of the portion of the concession assigned to him, it being then contemplated that the sale should be made to a company. The concession was obtained and assigned as agreed; the company paid the consideration agreed to be paid by them, but that which was to be given by Knap was not made good to the plaintiff, who alleged that it was now represented by £25,000 worth of shares in the West India and Panama Telegraph Company, and he prayed a declaration that he was entitled to those shares, and other relief. Under the concession from the Spanish Government, the West India Company (a company promoted by the International Company) had the exclusive right of telegraphic communication between Cuba, Porto Rico, Panama, the Windward Islands, and Demerara. The plaintiff contended that Knap had been a trustee for the International Company, or at all events its agent; and that, under the agreements of 1866, he had a charge on the concession and the fruits of it. The first contention having been abandoned at the bar, it was argued that by subsequent agreements the International Company had taken the place of Knap. It was further contended that there had been a wrongful sale to the West India Company, and that the plaintiff might waive the tort and take the fruits. Vice-Chancellor Bacon dismissed the bill, with costs, and the plaintiff appealed.—Lord Justice Baggallay read a long written judgment, in which he went elaborately into the facts of the case. He added that the equity asserted was of a singular character, but that as soon as the contentions as to Knap's trusteeship and agency were abandoned the case was really at an end. The plaintiff might possibly have some rights against Knap and against the International Company, but he had no equity to follow the shares. Lord Justice Lindley and Lord Justice Fry concurred, and the appeal was dismissed with costs.

The Long-Distance Telephone Company.

A FINANCIAL contemporary, commenting on the prospectus of the Long Distance Telephone Company, says:—"We cannot feel very hopeful about this company, and should not like to recommend investments in its shares. We are the more doubtful about it since an examination of its contracts and agreements has disclosed to us some anomalies. Five contracts and agreements are enumerated in the prospectus, and we have taken a special interest in those between Messrs. Hopkins & Shaw (the former being the owner of the patents bought by the company), Messrs. Shaw & Burgess, and Mr. Burgess and the present company. According to the contract between Hopkins & Shaw, dated the 16th January, the former party was to receive 25,000 dol. (£5,000). By a subsequent agreement, dated 7th April, the arrangement between these gentlemen is so far modified that Shaw is to pay only £3,000 instead of £5,000. Number three, however, dated 22nd March, had meantime introduced a sterling change. By a contract agreement of that date between Charles P. Shaw and Ephraim C. Burgess (Mr. Hopkins now politely withdrawing), Mr. Shaw is to receive £106,000, whereof £6,000 must be in cash and the £100,000 in fully paid up shares of the new company, for the rights and properties for which he was to pay £5,000 in January and which was modified to £3,000 in April. A very profitable business for Mr. Shaw, who has evidently cut his wisdom teeth. But there are more good things provided. There is another contract between (this time) Ephraim C. Burgess and the new company under which 'the patents and rights are agreed to be assigned' to the latter for £200,000, payable £25,000 in cash, £175,000 in fully paid up shares, 'and a third of any increased capital if issued.' A very respectable development of value from £5,000 (or £3,000) to £106,000 and £200,000, which makes £306,000 in all. It is in these circumstances almost modest of the same Ephraim C. Burgess to agree to pay preliminary expenses on condition of receiving one per cent. of the nominal capital of the company. Oh! Ephraim!!"

The Australasian Electric Light, Power and Storage Company (Limited).—A circular has been forwarded to us by this company, which states that Sir Julius Vogel has returned from his mission on behalf of the company to Australia and New Zealand. After reference to certain sales of arc plant, the directors say that the chief demand for internal lighting is undoubtedly for the incandescent system, for which there is practically an unlimited field, and there can be now absolutely no doubt as to electricity being the cheaper and better illuminant for the climates. It is also the directors' view that a very large field is opening for profitable business in the colonies, the cost of the incandescent light being estimated, on sound authority, at very much less than that of gas in any of the colonies, and the great heat of the climate giving a further immense advantage to electricity. A fair amount of incandescent plant has now reached the company's agents, and so far as the directors can judge the field is an exceptionally good one, and the company has got an exceptionally strong foot-hold in it.

The West India and Panama Telegraph Company (Limited).—At a meeting of the board of directors held on Wednesday the accounts for the six months to 31st December last were submitted, and showed a balance of £21,201 4s. 7d. on revenue account. The directors decided, after placing £15,000 to reserve, to carry forward the balance of £6,201 4s. 7d.

The London Platino-Brazilian Telegraph Company (Limited).—This company has declared a final dividend of 3s. per share, free of income-tax, making, with the previous payment, 2¾ per cent. for the year.

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